Growth and development of Newborn

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Newborn stage is the first 4 weeks or first month of life. It is a transitional period from intrauterine life to extra uterine environment. The Gestational Age of normal newborn is from 37 weeks to 42 weeks of intrauterine life

Normal newborn infant

Physical growth

- **Weight** = 2.700 – 4 kg

Normal newborn lose 5 % to 10 % of weight by 3-4 days after birth as result of:

- Withdrawal of hormones from mother.
- Loss of excessive extra cellular fluid.
- Passage of meconium (feces) and urine.
- Limited food intake.

Length

- Boys average length = 50 cm
- Girls average length = 49 cm
- Normal range for both (47.5- 53.75 cm)

Head circumference

- 33-35 cm
- Head is ¼ total body length
- Skull has 2 fontanels (anterior & posterior)

Anterior fontanel

- Diamond in shape
- Located between two frontal and two parietal bones
- 3-4 cm in length and 2-3 cm width
- It closes at 12-18 months of age

Posterior fontanel

- Triangular
- Located between occipital and two parietal bones
- It closes by the end of the first to the second month of age

Caput-succedaneum: Swelling or edema of thepresenting part of skull due to pressure during labour leads to accumulation of fluids and disappear by the third day

Cephalo- hematoma: Accumulation of blood between periosteum (membrane covers the surface of bone and flat bone of the skull). Disappear after few weeks.

Chest circumference: It is 30.5 to 33cm (usually 2–3cm less than head circumference).

Physiological growth

Vital signs

- Temperature (36.3 to37.2 C).
- Heart rate (100 to 160 b/min).
- Respiration (30 to 60 C/min).

Skin characteristics

1. **Skin color**: The skin of the newborn is red or dark pink.
2. **Lanugo hair**: Is a fine hair over the body, most evident on the shoulders, back, extremities, forehead and disappear during the first weeks of life.
3. **Vernix Caseosa:** Is a cheese like, yellowish white substance, sometimes liked to cream cheese cover the newborn's skin
4. **Desquamation (peeling):** It occurs during the first 2 to 4 weeks of life, due to shrink or separation of the placenta

5. **Mongolian spots***:* (Blue-back pigmented): At the base of the back and on the buttocks, usually disappear during the preschool age without treatment

Senses of Newborn

Vision

- Pupils react to light

Hearing

- Sounds are heard well before 10 days of life.
- The newborn infant responds to sounds with cry or eye movement.

Touch

- It is the most highly developed sense.
- It is mostly at lips, tongue, ears, and forehead.

Taste

- Well developed as bitter and sour fluids are resisted while sweet fluids are accepted.

Smell

- Only evidence in newborn infant's search for the nipple, as he smell breast milk.

Reflexes of Newborn

A- Feeding reflexes:

- Rooting
- Sucking
- Swallowing
- Gagging

B- Protective reflex:

- Blinking
- Grasping
- Tonic neck

- Moro reflex
- Coughing and sneezing

Adaptation to Extra uterine Life

Respiratory adjustment:

Fetal lungs are uninflected because newborn are not needed for oxygen exchange.

Site of gas exchange: Placenta.

Newborn : Immediately after birth, the newborn's lungs must inflate, and gas exchange must begin. First breath usually taken within 30 second after birth

Site of gas exchange: Lungs

Cardiovascular adjustment:
The transition from fetal to postnatal circulation involves the functional closure of the fetal shunts: the foramen ovale, the ductus arteriosus.

Thermoregulation

The process by which heat production is balanced with heat loss is called thermoregulation.

This process is developed poorly in the newborn due to:

- Immature hypothalamus
- A large surface area to body mass ratio
- Lack of subcutaneous fat
- Altered blood flow (e.g. peripheral cyanosis)
- Poor energy stores and limited fat = limited thermogenesis (heat production)

Methods of heat loss:

conduction, convection, radiation, and evaporation

A)Conduction: Heat is lost to a cold surface, such as a cold scale or board, touching the newborn's skin.

Prevention:
Warm all objects before the infant comes into contact with them.

(B)Convection: Heat is lost to air currents that flow over the newborn (e.g., from a fan, air conditioner, or movement around the crib).

Prevention:
· Keep infant out of drafts
· Close one end of heat shield in incubator to reduce velocity of air.

C) Radiation: Heat moves away from the newborn's body toward a colder object that is close by, such as a cold window or the sides of the bed.

(D) Evaporation: Heat is lost along with the moist that evaporates from the newborn's wet skin, if newborn is not dried immediately after birth or if wet clothes or blankets are left next to his skin.

Prevention:
Carefully dry the newborn infant after delivery or after bathing

Urinary System:

Normally, the newborn has urine in the bladder and voids at birth or some hours later. Total volume of urine per 24 hours is about 200 to 300 mL by the end of the first week. However, the bladder empties when stretched by a volume of 15 mL, resulting in as many as 20 voiding per day. The first voiding should occur within 24 hours. The urine is colorless and odorless. There is a functional deficiency in the kidney's ability to concentrate urine. The most common cause of failure to void in neonate is dehydration

Gastrointestinal adjustment:

Stomach capacity is limited to about thus, the infant requires frequent small feedings, limited ability to digest fats & starches. The colon also has a small volume; the newborn may have a bowel movement after each feeding. Newborns who breast-feed usually have more frequent feedings and more frequent stools than infants who receive formula.

Change in stooling Patterns of Newborns Meconium

The dark green substance forming the first Feces of a newborn infant. It composed of amniotic fluid and intestinal secretions, and possibly blood (ingested maternal blood). Term healthy neonates pass meconium between 24 to 48 hours following birth

Transitional stools

By 2nd - 3rd day, transitional stool passed after initiation of feeding; greenish brown to yellowish brown, thin and less sticky than meconium.

The liver adjustment:

The liver is also deficient in forming plasma proteins. The decreased plasma protein concentration probably plays a role in the edema usually seen at birth. Prothrombin and other coagulation factors are also low. The liver stores less glycogen at birth than later in life. Consequently, the newborn is prone to hypoglycemia, which may be prevented by early and effective feeding, especially breast-feeding.

Needs of newborn infant

- Maintaining a clear airway.
- Warmth.
- Protection from infection.
- Love and security (attachment).
- Nutritional needs

Nursing Care of newborn infant

1. Immediate assessment by **Apgar scoring**
2. Maintenance of a clear air way and initiation of respiration
3. Maintain thermal environment
4. Clamping the infant's cord
5. Care of eyes
6. Weighing the newborn
7. Identification of the newborn
8. Breast feeding
9. Fostering and promoting parents-infant attachment