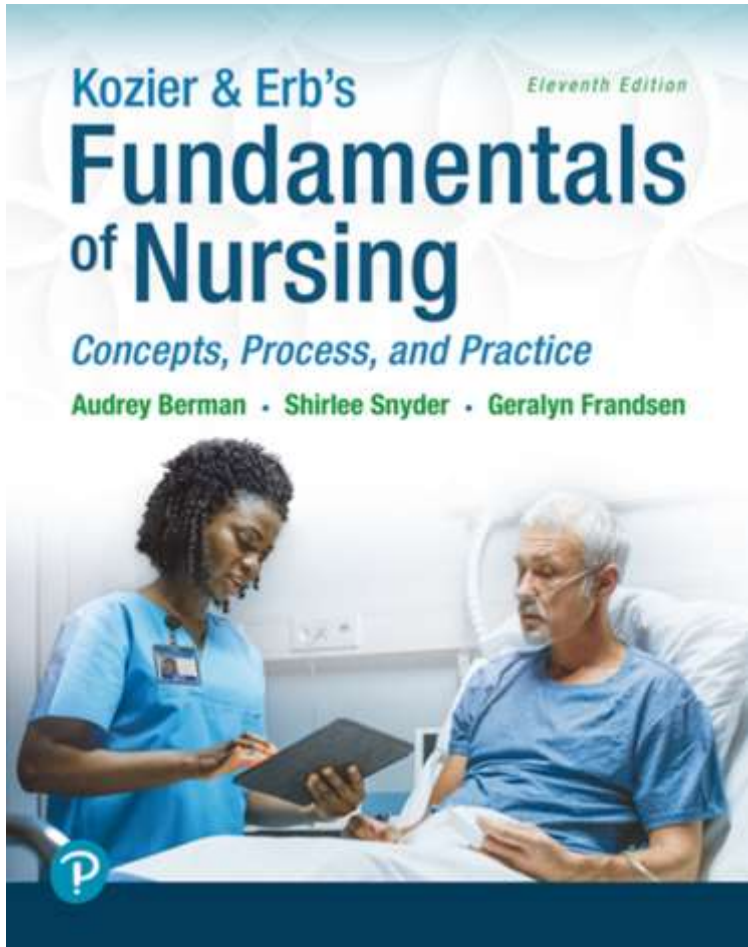
Growth and Development from Nursing Perspective

Unit 3 Promoting Health from Conception Through School-Age Children:

- ✓ Introduction
- ✓ Conception and Prenatal Development
- ✓ Neonates and Infants (Birth to 1 Year)
- ✓ Toddlers (1 to 3 Years)
- ✓ Preschoolers (4 and 5 Years)
- ✓ School-Age Children (6 to 12 Years)



Developmental Age Periods:

1) Fetal period

2) Infancy

3) Early Childhood

4) Middle Childhood

•5) Late Childhood

There are differences for these various age levels in

a)Function of various organ system;

b)Degree of immunity to disease;

c)Response to the effects of disease;

d)Drug dosages and tolerance to drugs;

e)Mental and motor ability,

f)Pattern of emotional response.

1) Fetal period

- From fertilized ovum formed until to delivery (about 40 weeks).
- Feature of Fetal period: easy abortion or malformation

Pregnancy/ Gestation

Length of time from conception (fertilization followed by **implantation**) to birth is about nine months (266 days)

Fetal Growth Assessment Methods

1-Measure the size of uterus on abdominal examination.

2-Palpate fetal head and body on abdominal examination.

3-Measure the size of fetus using antenatal ultrasonography (ultrasound).

4- Fetal movements:

-It indicate that the fetus is well.

-The fetal movements first felt:

a. At about 20 weeks in a Primigravida.

b. At about 16 weeks in a Multigravida.

Human Development Divided Into Two Parts

a. Embryonic development (months 1 and 2) :

Major organs are formed

b Fetal development (months 3-9):

Structures are refined

Stages of Fetal Development

1-Ovum

- The ovum is the female sex cell.
- It is regularly released by the ovary through the process of ovulation.
- The egg cell has a lifespan of 24 hours, it can only be fertilized within this period.
- After 24 hours, it regresses and is resorbed.

2-Sperm Cell

-The sperm cell has a lifespan of 48 to 72 hours

-Sperm Cell kinds:

a. Gynosperm : This is the X carrying sperm cell.

b. Androsperm :The sperm cell which carries the Y chromosome

- **Zygote**: Initial name for fertilized ovum(From fertilization to implantation)
- **Embryo:** Name of product of conception from second through 8th week of pregnancy(From fertilization to 5 to 8 weeks)
- **Fetus:** Name of product of conception from 9th week through duration of gestational period(From 8 weeks until term)

Conceptus

Developing embryo or fetus and placental structures throughout term

Fertilization

- During ovulation the ovum leaves the ovary and enters the fallopian tube.
- Fertilization generally occurs in the outer third of the fallopian tube.
- Subsequent changes in the fertilized ovum from conception to implantation are illustrated

Segmentation

-Within a few hours after fertilization, the zygote, begins a process of internal division.

-This process of cell division in the zygote is called segmentation.

First, it divides into two cells, then four, eight, sixteen, and so on, doubling the number with each new division.

Segmentation

- It transforms the zygote into a cluster of cells called **Morula** which, seen through a microscope, resembles a mulberryالتوت.
- The morula slowly moves down the Fallopian tubes toward the uterus, where it arrives after about three days.
- By this time, it has developed into a hollow ball of cells called **Blastocyst**.

Implantation

-It takes 3 to 4 days for the zygote journey to the uterus, where implantation will take place and during such journey cell division happens.

-It takes 7 to 8 days from fertilization to implantation.

-Implantation occurs at high and posterior portion of the uterus.

-On implantation, the structure is called **embryo** until 5-8 weeks when it begin to be referred to as **fetus**.

Fetal development stages

- In the beginning sperm joins with ovum (egg) to form one cell, it is smaller than a grain of salt.
- This union brings together the 23 chromosomes from the father with the 23 chromosomes from the mother to make a single new life with 46 chromosomes
- The genetic blue print for the development of every detail this new person will ever have.

Fetal development stages

-At the end of the **first week** it implants itself into the lining of the uterine wall and draws nourishment from its mother.

- **Day 1**: conception takes place

-10 days: mother's menses stop

-From **Days 10-14** the developing embryo signals its presence through placentaI chemicals and hormones to the mother's body telling it to cease menstruation.

Fetal development stages

- **Day 15**: The primitive streak can be seen on the left side of this embryo.
- **Day 17** : The primitive streak can still be seen, and the opposite end of the embryo is starting to fold up.
- **18 days**: heart begins to beat
- The fetus's heart beats 54 million beat during pregnancy
- **Day 19:** The neural tube is seen along with somites on either side of it.

Fetal development stages

- By only **Day 20** foundations of the brain, spinal cord and nervous system are already established
- **21 days** : heart pumps own blood through separate close circulatory system with own blood type
- By the **4th week**, the **backbone** and **muscles** are forming. **Arms**, **legs**, **eyes**, and **ears** have begun to show.

Fetal development stages

- **28 days** – eye, ear, and respiratory system begin to form
- **42 days** – brain waves recorded skeleton complete, reflexes present

Fetal development stages

- **One month** old, the embryo is 10,000 times larger than the original fertilized egg and is developing rapidly.
- At **Week 5** five **fingers** can be discerned in the hand. The **eyes** darken as pigment is produced. **Brain waves** can be detected and recorded
- The embryo has a marked C-shaped body and a rudimentary tail.

Fetal development stages

- At **Week 6** the **liver** is now taking over production of blood cells, the **brain** begins to control muscle movements and organs.
- **Week 7 -** The embryo begins to **move** spontaneously.
- The **jaw** forms, including **teeth** buds in the gums. capable of thumb sucking
- Soon the eyelids will seal to protect the embryo's developing light-sensitive **eyes**, and will reopen at about the seventh month
- The head is rounded and nearly erect.
- The eyes have shifted forward and closer together, and the eyelids begin to form.

Fetal development stages

- **By the 8th Week** now-called fetus is a little more than an inch long.
- The fetus has now everything found in a fully developed adult**,** all body systems present.
- The **heart** has been beating for more than a month, the **kidneys** are functioning; the **stomach** is producing digestive juices.
- **And it responds to touch**.
- At **Week 9** the tiny one has **fingerprints** and will **curve its hand** around an object placed in its palm.

Fetal development stages

- **By Week 10** the fetus can **squint**, **swallow**, and **wrinkle its forehead** moves tongue, makes fist
- **11 weeks** – spontaneous breathing movements, has fingernails, all body systems working
- The fetus is now about 2 inches long.
- **Urination** occurs.
- Muscle movements are becoming more coordinated

Fetal development stages

- **12 weeks** – weighs one ounce Now **3 months** old, the unborn **sleeps**, **awakens**, and **exercises its muscles**.
- It "**breathes**" amniotic fluid to help develop its respiratory system.
- Fine **hair** is growing on the head.
- **The fetus at 14 weeks:** During this period of rapid growth, the skin is so transparent that blood vessels are visible beneath it.
- More muscle tissue and body skeleton have developed, and they hold the fetus more erect.

Fetal development stages

16 weeks –

- Genital organs clearly differentiated,
- Grasps with hands,
- Swims, kicks, turns, somersaults, (still not felt by the mother)

At **4 months** the fetus is 8-10 inches long and weighs half a pound.

- The mother starts to “show.”
- The baby’s **ears** are functional. It can hear its mother

18 weeks –

- Vocal cords work

Fetal development stages

20 weeks

- Has hair on head, weighs one pound, 435 to 465 G and measures about 19 cm.
- Subcutaneous deposits of brown fat make the skin a little less transparent. “Woolly” hair covers the head, and nails have developed on the fingers and toes.
- There is definite movement felt by the mother.
- The unborn may jump in reactions to startling or loud noises.

Fetal development stages

23 weeks –

15% chance of viability outside of womb if birth premature

24 weeks :

56% of babies survive premature birth.

- At the 6th month oil and sweat glands are now functioning.
- The delicate skin is protected from the fetal waters by a special ointment called “vernix.”

25 weeks

79% of babies survive premature birth

Fetal development stages

At **Month 7** the baby now **uses** the four senses of **hearing, vision, taste, and touch**.

The child can **respond** to his or her mother's voice.

- In the **8th month** the skin begins to thicken with a layer of fat stored underneath for insulation and nourishment.
- Antibodies increasingly build up.

Fetal development stages

- In the **8th month**
- The baby is nearly ready for life outside the womb, toward the end of this month the baby is ready for birth.
- By this time the infant normally weighs 6 to 9 pounds, and his or her heart is pumping 300 gallons of blood per day.

2) Infancy

a. Neonate: Birth to 28 days

Features of Neonatal period:

•The physiological regulation ability and adaptation to circumstances are very poor.

•The morbidity and mortality are very high

Health needs:

1- Nutrition

2- Proper Care

3-prevention of diseases

2) Infancy

b. Infancy: 1 month to 1 year (From Birth to 1 year)

Features of Infant period:

1- Most rapid growth and development in the lifespan.

2-Fastest brain growth

3-Nutrition and energy requirement are high

4-Digestion and absorption functions are poor

5-Passive immunity gradually drops

2) Infancy

b. Infancy: 1 month to 1 year (From Birth to 1 year)

Features of Infant period:

6- Morbidity and mortality related to:

- Congenital anomalies,
- Low birth weights,
- Accidents, closed head trauma and falls

Health needs :

a. Nutrition
b. Prevention from diseases

3) Early Childhood: 1-6-7 years

a. Toddler: 1-3 years.

Features of Toddler period:

1-Growth becomes slower

2 -Intelligence develops faster

3- Curious and very active

4-Favorite word is **No**!

5- Separation anxiety 18-24 months

Health needs:

a. Nutrition
b. Prevention of disease
c. Prevention of accident

3) Early Childhood: 1-6-7 years

b. Preschool: 3-6-7 years

Features of Preschool period:

1-Growth becomes slower,

2-More mature intelligence.

3-Strong desire for knowledge

4- Imitating adult’s behavior

5- Achieved some independence from parents with simple tasks.

6-Toilet trained around 3rd birthday.

3) Early Childhood: 1-6-7 years

b. Preschool: 3-6-7 years

Features of Preschool period:

7- Gross motor skills well defined.

8-Can walk, run, jump and climb efficiently.

9-Fine motor skills developing

10-Enjoy coloring, drawing, manipulating smaller toys

11-Favorite word is **why?**

Health needs:

a. Nutrition
b. Prevention of diseases
c. Prevention of accident
d. Good habit training

4) Middle Childhood:

School age: 6 to 12 years

Features of Middle Childhood:

1-Growth becomes relatively steady

2- More mature intelligence developed

3- Increasing desire for knowledge

4-Decreasing incidence of diseases

5-Fine motor skills continue to develop.

4) Middle Childhood:

School age: 6 to 12 years

Features of Middle Childhood:

6-Eager to please parents and other adults

7- Friends becoming more important.

8- Compares self to others.

9- Learning rules, ‘winners’ and ‘losers.

4) Middle Childhood:

School age: 6 to 12 years

Health needs:

1-Nutrition

2-Prevention of myopia (قصر النظر)and dental caries

3-Prevention of psychological problems

4-Emotion and behavior care

5) Late Childhood

Adolescent from 13 years to approximately 18 years

-Female: from 11-12 years to 17-18 years

-Male: from 13-14 years to 18-20 years

Features of Adolescence:

1-The second fastest period of growth and development

2-Neuroendocrine regulation unsteady

3-Having problems in psychology, emotion, behavior

4-Struggle for independence

5) Late Childhood

Adolescent from 13 years to approximately 18 years

Features of Adolescence:

5-Peers more important to them than family

6-Significant peer pressure

7-Puberty begins.

8-Participating in group activities and fitting in is vital

9-Participation in sports with more risk (skateboarding, rock climbing)

10- Morbidity and mortality in adolescence related to:

- Accidents e.g motor vehicle accidents, drowning, sports injuries, head trauma, firearm injuries
- Cancer
- Homicide and suicide

ASSESSMENT OF GROWTH:

Done by anthropometric measurement and the study of velocity(speed) of physical growth.

1) WEIGHT

- Is one of the best criteria for assessment of growth
- Weight of the full terms neonate at birth is approximately 2.5 kg to 3.5kg.
- 10% loss of weight first week of life, which regains by 10 days of age.
- Then, weight gain is about 25- 30 gm per day for 1st 3 month and 400gm/ month till one year of age.

1) WEIGHT

- The infants double weight gain their birth weight by 5month of age
- Trebled by one year
- Fourth time by two years
- Five times by three year
- Six times by five year
- Seven times by seven year
- Ten times by ten year.
- Then weight increases rapidly during puberty followed by weight increase to adult size

2) Length and height

- Increase in height indicates skeletal growth.
- Yearly increments in height gradually diminished from birth to maturity.
- At birth average length of a healthy newborn baby is 50 cm.
- It increases to 60 cm at 3 months,
- Increases70 cm of 9 month
- 75 cm at one year of age.

2) Length and height

- In second year, there is 12 cm increase
- In third year it is 9 cm,
- In fourth year it is 7 cm
- In fifth year it is 6 cm.
- So the child doubles the birth by 4 to 4.5 years of age afterwards there is about 5 cm increases in every year till onset of puberty.

3) Body Mass index (BMI)

- Assess the normal growth or its deviations i.e. malnutrition or obesity.

$$BMI = \frac{\text{Weight in Kg}}{(\text{Height in meter})^2}$$

- BMI remains content (relaxed) up to the age of 5 years.

3) Body Mass index (BMI)

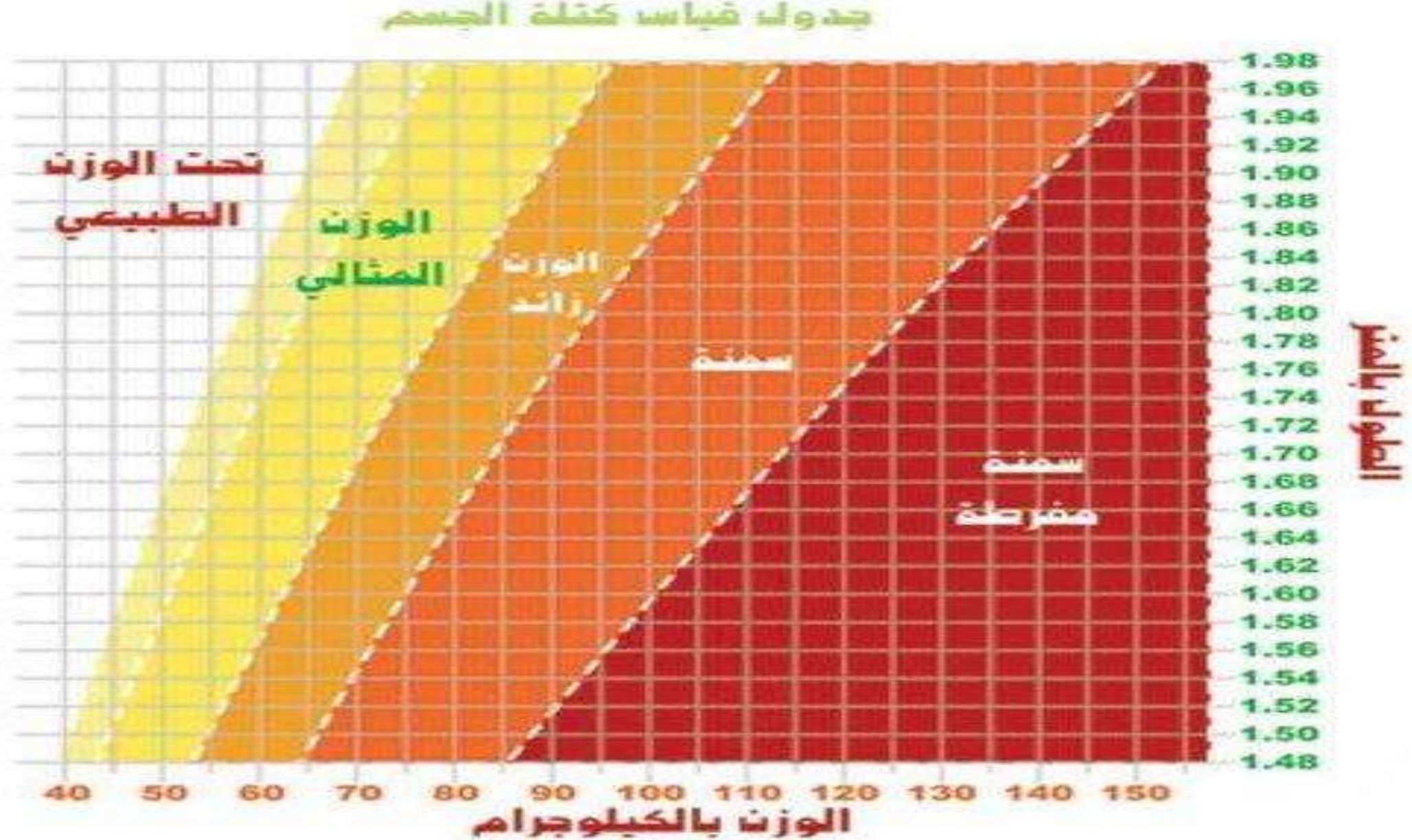
- If the BMI is more than 30 kg/m2, it indicates obesity
- If it is less then 15Kg/m2, it indicates malnutrition.
- BMI Categories:-

–Underweight = <18.5

–Normal weight = 18.5–24.9

–Overweight = 25–29.9

–Obesity = BMI of 30 or greater


جدول قياس كتلة الجسم
تحت الوزن الطبيعي
الوزن المثالي
الوزن زائد
سمنة
سمنة مفرطة
1.98
1.96
1.94
1.92
1.90
1.88
1.86
1.84
1.82
1.80
1.78
1.76
1.74
1.72
1.70
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1.64
1.62
1.60
1.58
1.56
1.54
1.52
1.50
1.48
40 50 60 70 80 90 100 110 120 130 140 150
الوزن بالكيلوجرام

4) Head Circumference

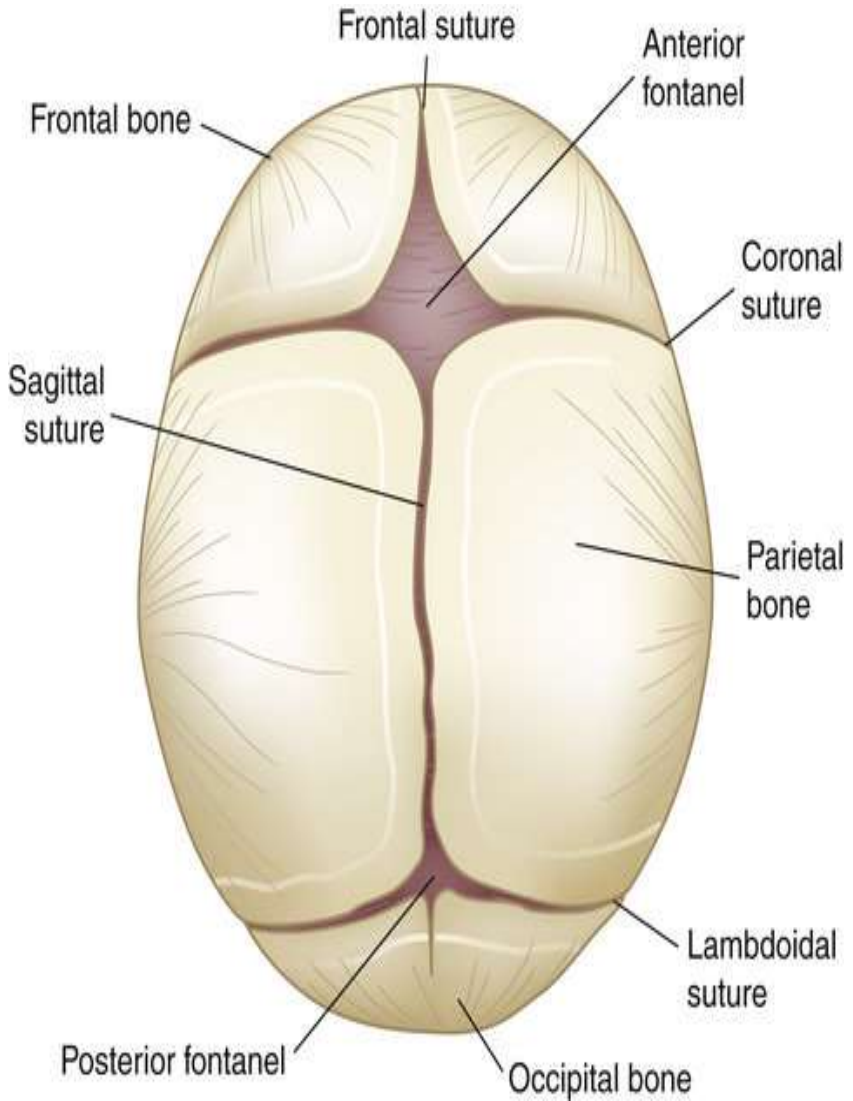
- It is related to brain growth and development of intracranial volume.
- Average head circumference measured about 35 cm at birth.
- At 3 months it is about 40 cm,
- At 6 month 43 cm,
- At one year 45cm,
- At 2 years 48 cm,
- At 7 year 50 cm
- At 12 years of age it is about 52 cm, almost same a adult.

4) Head Circumference

- If head circumference increase more than 1 cm in two weeks during the first 3 month of age then hydrocephalus should be suspected.
- HC is measured by ordinal tap.
- Placing it over the occipital protuberance at the back, above the ear on the side and just over the supraorbital ridges in front measuring the point of height circumference.

5) Fontanels Closure

- At birth, anterior and posterior fontanels are present.
- Posterior fontanels close early few weeks (6-8week) of age.
- The anterior fontanels normally close by 12-18 months of age.
- Early closure of fontanels indicates craniostenosis due to premature closure of skull sutures.



6) Chest circumference

- Assessment of growth and nutrition status.
- At birth it is 2-3cm less than head circumference.
- At 6 to 12 months of age both become equal.
- After first year of age, chest circumference is greater than head circumference by 2.5 cm
- By the age of 5 year, it is about 5 cm larger than head circumference.
- Chest circumference is measured by placing the tape measure around the chest at level by placing the tape measure around the chest at the level of the nipple, in between inspiration and expiration.

7) Mid Upper Arm Circumference (MUAC)

- Assess the nutritional status of younger children.
- The average MUAC at birth is 11 to 12 cm,
- At One Year Of Age It Is 12 To 16 Cm,
- At 1 To 5 Years It Is 16 To 17 Cm,
- At 12 Years It Is 17 To 18 Cm
- At 15 Years it is 20 to 21cm.

8) Eruption of teeth

- There is a variation for the time of eruption of teeth.
- First teeth commonly lower central incision appear in 6 to 7 months of age.
- It can be delayed even up to 15 months, which also can be considered within the normal range of time for teething.
- So dentition is not dependable parameters for assessment of growth.
- There are ‘two sets of teeth, temporary teeth bigger in size for two sets of teeth.

Eruption of Primary Teeth

	Upper Arch	Lower Arch
Central Incisorsقواطع	10 Months	8 Months
Lateral Incisors	11 Months	13 Months
Canine ناب	19 Months	20 Months
First Molar ضرس	16 years	16 years
Second Molar	29 years	27 years

Permanent Teeth

Molar	6 to 7 years
Central and lateral incisors	6 to 8 years
Canines and premolars الضواحك	9 to 12 years
Second molars	12 years
Third molars	18 years or later

9) Osseous Growth

- Bony growth follows a definite pattern and time schedule from birth to maturation.
- It is calculated by the appearance of ossification center by X-ray study.
- Skeletal maturation or bone growth is an indicator of physiological development and continue up to 25 years of age.

ASSESSMENT OF DEVELOPMENT

Assessment of Development

• Healthy development, in social/emotional, communication, and behavior, should be monitored by parents and physicians through screenings at each visit.

•Normal development is a complex process

Denver Developmental Screening Test (DDST)

❖Gross motor skills.

❖Language.

❖Fine motor adaptive.

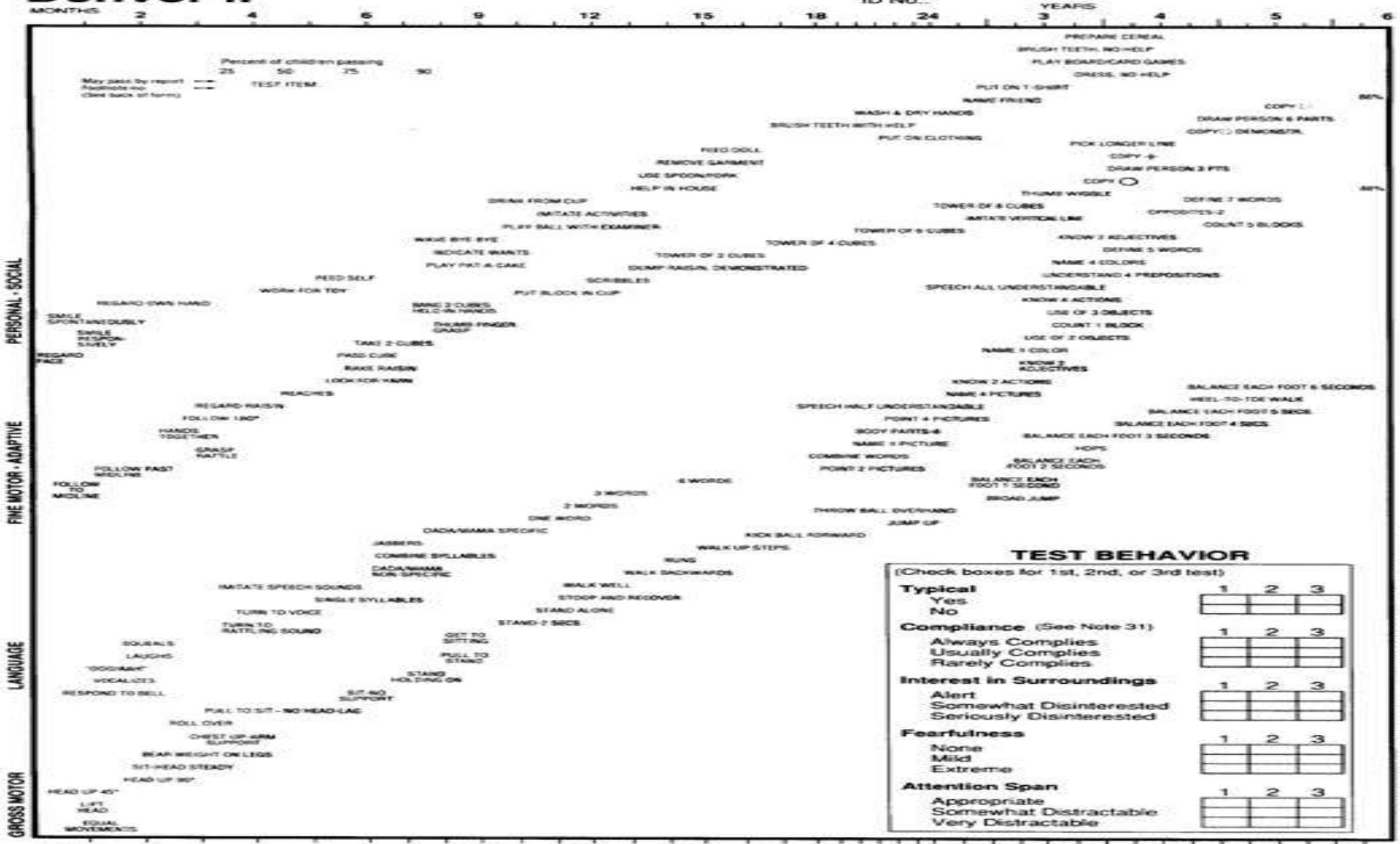
❖Personal - social.

DA FORM 5694, MAY 1988

Denver II

Examiner:
Date:

Name:
Birthdate:
ID No.:



TEST BEHAVIOR

(Check boxes for 1st, 2nd, or 3rd test)

	1	2	3
Typical			
Yes			
No			
Compliance (See Note 31)			
Always Complies			
Usually Complies			
Rarely Complies			
Interest in Surroundings			
Alert			
Somewhat Disinterested			
Seriously Disinterested			
Fearfulness			
None			
Mild			
Extreme			
Attention Span			
Appropriate			
Somewhat Distractable			
Very Distractable			

Assessment of Development

Assess domains development :

1–Gross motor

2–Fine motor skill

3–Personal and social

4–Language

5–Vision

6– Hearing.

1. Gross Motor Development

Motor development progress in an orderly sequence to ultimate attainment of locomotion and more complex motor tasks thereafter.

Gross Motor Development Milestones

Age	Milestone
3months	Neck holding
5 months	Rolls over
6 months	Sits with own support, bear almost all his weight
8 months	Sitting without support

Gross Motor Development Milestones

Age	Milestone
9 months	Standing holding on (with support), holding on the furniture
12 months	Creep well, stand without support,
15 months	Walks alone creeps upstairs
18 months	Runs

Gross Motor Development Milestones

Age	Milestone
2 years	Walks up and down stairs
3 years	Rides tricycle
4 years	Hops on one foot, alternate feet going downstairs

2. Fine Motor Skill Development

- It depends upon neural tract maturation.
- It promotes adaptive actives with fine sensor-motor adjustments and includes eye coordination, hand eye coordination, hand to mouth coordination, hand skill as finger thumb apposition, grasping, dressing

Age	Milestone
12-20 weeks	Observes his own hands (hand regard)

Offer a red cube to the child

4months	Reaching out for the objects with both hands, hand of the child come together at midline as he plays

Fine Motor Development Milestone

Age	Milestone
6months	▪ Reaching out for the objects with one hand. ▪ Can take a biscuit to his mouth and chew
7 months	Transfer objects from one hand to other
8- 9months	Immature pincer grasps, able to grasp from the radial side of the hand
12months	▪ Pincer grasps mature, mature grasp (index finger and thumb) is evident. ▪ Tries to feed self from a cup but spills some of content. ▪ Starts to pull off mittens, caps and socks

Fine Motor Development Milestone

Age	Milestone
15months	Imitates scribbling, tower of 2 blocks
18months	Scribbles, tower of 3 blocks
2years	Tower of 6 blocks, vertical and circular stroke

Fine Motor Development Milestone

Age	Milestone
3 years	Tower of 9 blocks, copies circle
4years	Copies cross, bridge with blocks
5years	Copies triangle, gate with blocks

3. Personal And Social Development

It is related to interpersonal and social skill as social smile, recognition of mother, use of toys.

1 month	▪ Child intently watches his mother when she talks to him
2months	▪ Social smile
3months	▪ Recognizes mother. Enjoys looking around

4. Social and Adaptive Milestones;

6 months	▪ Recognizes strangers, stranger anxiety. ▪ Vocalizes and smiles at his mirror image and imitates acts such as cough or tongue protrusion
9 months	▪ Waves “bye, bye” ▪ Repeats any performance that evokes an appreciative response from the observers

4. Social and Adaptive Milestones;

12 months	▪ Comes when called, plays simple ball game.
	▪ Understand simple questions like ‘where is Your papa?’
15 months	▪ Jargon
18 months	▪ Copies parents in tasks

4. Social and Adaptive Milestones;

2years	Asks for food, drink, toilet
3years	Shares toys, knows full name and gender
4years	Plays cooperatively in a group, goes to toilet alone.
5years	Helps in household tasks, dressing and undressing

5. Language Development

Age	Milestone
1m	Alerts to sound
3months	Coos (musical vowel sounds)
4months	Laugh loud
6months	Mono-syllables (ba, da, pa) sound
9months	Bi-syllables (mama, baba, dada) sound

5. Language Development

Age	Milestone
12months	1-2 words with meaning
18 months	8 -10 words vocabulary
2years	2-3 word sentences, uses pronouns “I”, “Me”, “you”
3 years	Ask question
4years	Says songs or poem, tell stories
5years	Asks meaning of words

6. Vision

1 month	fixate on his mother as she talks to him
3-4 months	fixate intently on an object shown to him (grasping with eye)
6 weeks	binocular vision begins and is well established by 4 months
6 months	adjusts his position to follow object of interest
1 year	follow rapidly moving

7. Hearing

3-4 months	Turns his head towards the source of sound
5-6 months	Turns the head to one side and then downward if a sound is made sound below the level of ears.
10 months	Directly looks at the source of diagonally

Nutrition Needs of Children

Nutrition:

- It is the process by which living organisms obtain food and use it for growth, metabolism, and repair.
- Its stages includes: ingestion, digestion, absorption, transport, assimilation, and excretion

Food

- It is any substance consumed to provide nutritional support for an organism.
- It comes from plant or animal origin
- It can be either in liquid or solid form
- It provides body with nutrients and enzymes to produce energy, maintain process growth, repair or reproduction.

Kinds of Nutrients

Macronutrients

- Carbohydrates
- Fibre
- Fat
- Essential fatty acids: omega-3 and 6
- Protein
- Water

Kinds of Nutrients

Micronutrients

- **Minerals:**

a. **Macro-minerals: ca, cl, Mag, Phoss, k, Na**

b. **Trace minerals: Cobalt Copper, Chromium, Iodine, Iron, Mang, Selenium, Zinc**

- **Vitamins: Vitamin D, vitamin C**

?????

THANKS