GROWTH & DEVELOPMENT

Dept. of Paediatrics

Definition-

- Growth-The term growth denotes increased in size and mass of tissue.

- Development-specifies maturation of functions. it is related to maturation and myelination
of nervous system and indicates acquisition of variety of skills for optimal functioning of the individuals.

Factors affecting growth and development

1) **Genetic factors** –

a) phenotype:-external traits of parents

b) characteristics of parents:-parents with
High IQ are more likely to have children with high IQ.
Children with certified mentally subnormal mothers have low IQ.

c)race:-variable growth potentials.

d)sex:-boys are longer and heavier than girls at birth.

e)Biorhythm and maturation:-daughters often reach menarche at similar age as mothers.

f)Genetic disorders:-1.choromsomal abnormalities

2.gene mutation

g)Children of multiple pregnancies:-ultimate growth of these children is related to differences in birth wt. of twins.

2)Environmental factors

a) prenatal period

- ✓ the progeny usually shows greater similarity to the mother in respect of somatic development,physiological and biochemical maturation.
- ✓ maternal maturation is identified with intrauterine growth retardation and consequently small size of fetus.
- ✓ medical illness and infections in mother also result in poor growth of fetus.
- ✓ administration of some drugs eg-thaladomide results in limb abnormalities.
- ✓ maternal infections eg-rubella,syphilis,viral hepatis,cmv,toxoplamosis may retard fetal development.

- hormones-maternal myxedema results in fetal hypothyroidism,administration of anti thyriod drugs and iodides during later part of pregnancy may induce fetal goiter and hypothyroidism.

- insulin stimulates fetal growth-in mothers with overt and latent diabetes fetus is usually large and excessive birth weight.

- somatomedin(igf1,2)in dwarfism,length of baby is small at birth.

b)postnatal period

✓nutrition: eg-pem,anemia,vitamin deficiencies in children result in poor growth

✓chemical agents-administration of androgenic hormones initially accelerates the skeletal growth but ultimately epiphysis of bones close prematurely and final height of children is less.

✓trauma: fracture of end of bones damages the growing epiphyses and thus hampers skeletal growth.

✓infections and infestations-decrease in growth velocity.

✓social factors: high socioeconomic levels better nutrition.

- ✓ emotional factors:chidren from broken homes,orphan ages do not grow at optimal rate.
- ✓ cultural factors: religious taboos against consumptions of particular food stuff.

LAWS OF GROWTH

1) Growth and development of children is a continuous and orderly process.

fetus grows fast in first half of gestation thereafter growth is lowed till baby is born.

in early post natal period velocity of growth is high in first few mths.

steady rate of growth during mid childhood.

second phase of accelerated growth is during puberty and then ceases slowly.

2) Growth pattern of every individual is unique: in humans cephalocaudal and distal to proximal.

3) Different tissues of body grow at different rates

- general body growth: is rapid during fetal life, first one or two yrs of post natal life and during puberty

- brain growth : enlarges rapidly during later months of fetal life and early mths of post natal life the head size reaches 90% of adult head size by age of 2 yrs

- growth of gonads is dormant during childhood becomes conspicuous during puberty

- lymphoid growth most noticeable during mid childhood .

Formulas for app. Average Ht & Wt

Age	Formula for wt.
Birth	3.25+or- 1 kg
3-12 mths	[age(mths)+9]/2
1-6 yrs	[2 * age(yrs)+8]
7-12 yrs	[7*age(yrs)-5]/2

- * means to multiply

Age	Formula for Ht
Birth	50 cms
At 1 yr	75cms
2-12 yrs	6*age(yr)+77

Change in body proportions

Age	[(u/s) / (l/s)]
Birth	1.7/1.0
6 mths	1.6/1.0
1 yr	1.5/1.0
3 yr	1.3/1.0
7 yr	1/1
9 yr	0.9/1/0

Dentition

Teeth	Age of eruption primary (mths)		Age of eruption perm (years)		Age of shedding primary (years)	
	(max)	(min)	(max)	(min)	(max)	(min)
C.incisors	6-8	5-7	7-8	6-7	7-8	6-7
L. incisors	8-11	7-10	8-9	7-8	8-9	7-8
Canines	16-20	16-20	11-12	9-11	11-12	9-11
1st premolar	_	_	10-11	10-12	_	_
2nd premolar	_	_	10-12	11-13	_	_
1st molar	10-16	10-16	16-17	16-17	10-11	10-12
2nd molar	20-30	20-30	12-13	12-13	10-12	11-13
3rd molar	_	_	17-21	17-21	_	_

Anthropometry

- IMP PARAMETERS

1. Head circum.
2. Chest circum.
3. Mid arm circum.
4. Ht/length(<2 yrs)
5. U/S and L/S ratio

REMEMBER

Neonate loses 10% of body wt in first week
They regain birth wt by 10 days
Daily wt gain in first 3 mths= 25-30 g/day
By 6 mths doubles body wt
By 1 yr treples body wt
By 2 yr four times body wt
By 5 yrs five times body wt
Between 3-7 yrs wt gain 2kg/yr

Height

Birth : 50 cm

9 mths :70 cm

1 yr :75 cm

2 yr :90 cm

3 yr :95 cm

5 yr :100 cm

Between 5-10 yrs ht inc by 5 cm/yr

Head Circumference

First 3 mths :2cm/mth

Next 3 mths :1 cm/mth

Next 6 mths :0.5cm/mth

Total increement in 1st yr:12 cm

2nd yr:48 cm

7 yr :50 cm

12 yr :52 cm

H.C. should not exceed crown rump length in 1st yr

Assessment of Growth and Development

- Physical growth assessment – Anthropometry
- Skeletal assessment – by radiography for centres of ossification and bone growth
- Tissue growth assessment –

1. Subcutaneous fat – by skinfold callipers or soft tissue radiography
2. Bone growth – radiography
3. Muscle mass – measuring bone width ,s.c. fat and muscle mass from soft tissue radiography of arm or forearm

- Assessment of dental development

  By counting no. of teeth erupted either fully or partially
- Developmental Assessment

  Assessed in 4 parameters

1. Gross Motor
2. Fine Motor
3. Social
4. Linguistic

- May be done by:

1. Gessell's criteria
2. Denver development scale
3. Bayles development scale

- D.Q.=[(maturity age)/(chronological age)] X 100
- A child having DQ between 65-75 is at risk of dev. delay.

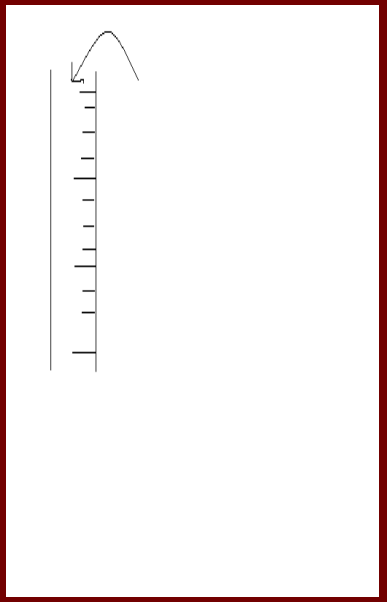
Anthropometric Criteria used to detect malnutrition

- Growth cards :monitor growth continously.if the curve lies below the standard range or curve becomes flat – alarming factor
- Velocity of growth imp than actual wt at a given time.
- Age independent indices

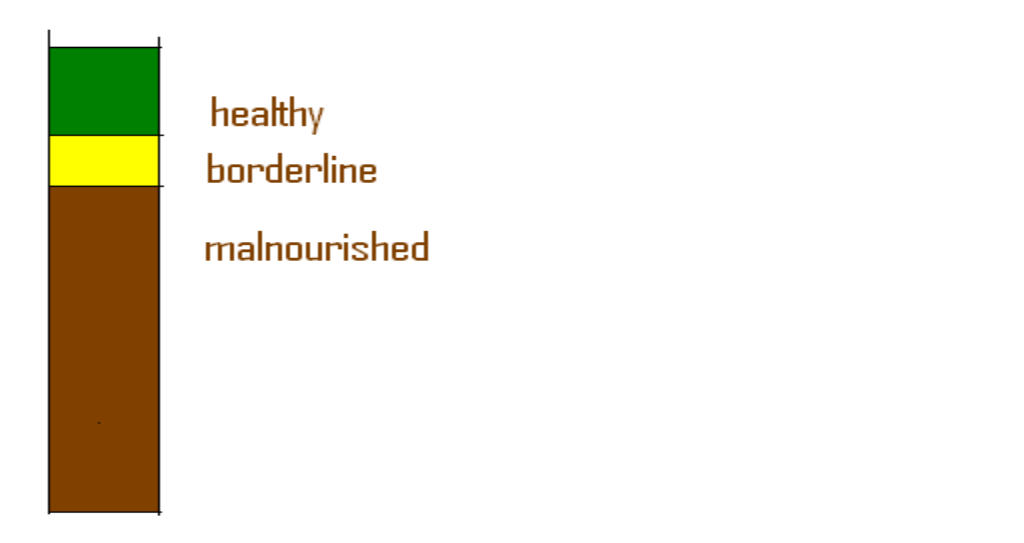
1. Kanawati's index –	normal	malnutrition
Midarm circum./head circum.	.32-.33	0.25
2. Raosingh 's index -		
Wt(kg)/ht(cm)3 X 100	0.88 – 0.97	0.79

- Quac stick (Quackers arm circum. Stick)

- Height calibrated
- Stick placed behind standing child
- Inference : if ht >ht expected for measured MAC then child is malnourished



- Shakir’s Tape for M.A.C
- Plastic tape with 3 colored zones



- Bangle Test – a bangle of inner dm of 4 cm is slipped up the arm
- Inference :if bangle crosses elbow then child malnourished

Thank You