Nutritional Disorders – Dr. Khalid

Malnutrition

- It is a pathological state due to a relative or absolute deficiency or excess of one or more essential nutrients; clinically manifested or detected only by biochemical, anthropometric or physiological tests.

Classification:

1. *Under-nutrition:* Marasmus
2. *Over-nutrition:* Obesity, Hypervitaminoses
3. *Specific Deficiency:* Kwashiorkor, Hypovitaminoses
4. *Mineral Deficiencies*
5. *Imbalance:* Electrolyte Imbalance

Etiology:

A. *Child related:*
   - Low birth wt.
   - Absence or early cessation of breast feeding
   - Delay weaning
   - Incorrect dietary habit
   - Recurrent infection: diarrhea, measles
B. *Maternal factor:*
   - Maternal malnutrition
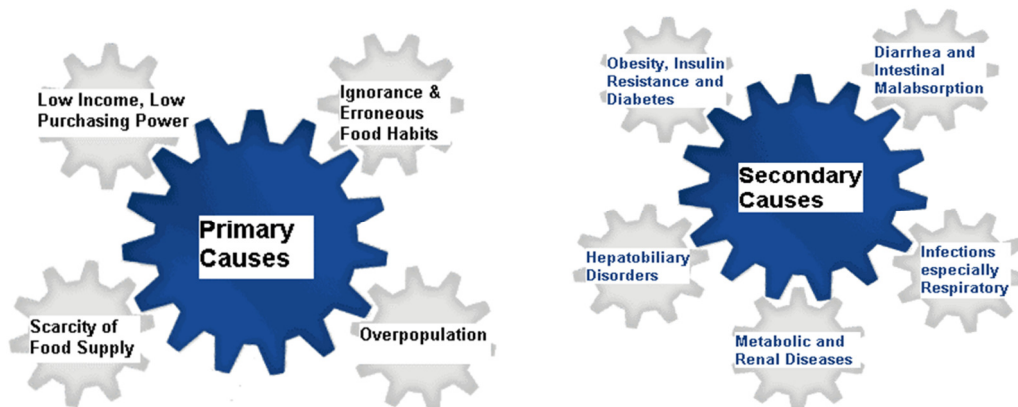   - Ignorance about feeding
   - separation
C. *Socio-economical factor:*
   - Poverty and unemployment
   - Large family size
   - Unhygienic living condition
   - Disadvantaged children
D. *Cultural factor:* wrong believes
E. *Community factor:*
   - Natural/man-made disaster
   - Generalized economic depression
   - Inadequate primary health care

Classification of Under-nutrition

1. Gomez Classification: uses weight-for-age measurements; provide grading as to prognosis

Weight-for-Age%   Status

- 91-100   Normal
- 76-90   1st degree
- 61-75   2nd degree
- <60   3rd degree

2. Wellcome Classification: simple since based on 2 criteria only - wt loss in terms of wt for age% & presence or absence of edema

Wt-for-Age%   Edema   No Edema

- 80-60   Kwashiorkor   Under-nutrition
- < 60   Marasmic- Kwashiorkor   Marasmus

Protein Energy Malnutrition Iceberg
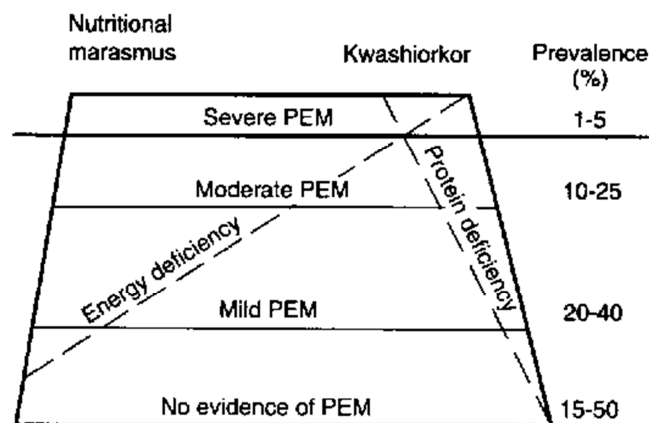
Marasmus

- Common in the 1st year of life
- Etiology:
    - "Balanced starvation"
    - Insufficient breast milk
    - Dilute milk mixture or lack of hygiene
    - Deficiency of ALL nutrient

Marasmus

Clinical Manifestations:
1. Wasting
2. Muscle wasting
3. Growth retardation
4. Mental changes
5. No edema
6. Variable-subnormal temp, slow PR, good appetite, often w/diarrhea, etc.

Laboratory Data:
1. Serum albumin N
2. Urinary urea/ creatinine N
3. Urinary hydroxyproline/ creatinine low
4. Serum essential a.a. index N
5. Anemia uncommon
6. hypoglycemia
7. K+ deficiency present
8. Serum cholesterol low
9. Diminished enzyme activity
10. Bone growth delayed
11. Liver biopsy N or atrophic

Clinical classification of marasmus

- *Grade 1:* Loss of axillary fat
- *Grade 2:* Loss of fat from gluteal region
- *Grade 3:* Loss from chest & back
- *Grade 4:* Loss of buccal & temporal

Kwashiorkor

- Between 1-3 yrs old
- Etiology:
  - Very low protein but calories from CHO
  - In places where starchy foods are main staple
  - Never exclusively dietary

Clinical Manifestations:
A. Diagnostic Signs
  1. Edema
  2. Muscle wasting
  3. Psychomotor changes
B. Common Signs
  1. Hair changes
  2. Diffuse depigmentation of skin
  3. Moon face
  4. Anemia

C. Occasional Signs:
  1. Flaky-paint rash
  2. Noma
  3. Hepatomegaly
  4. Associated
Laboratory:
  1. Decreased serum albumin
  2. EEG abnormalities
  3. Iron & folic acid deficiencies
  4. Liver biopsy fatty or fibrosis may occur

Laboratory:

- The following data will be less than normal:
- Hb, serum albumin, blood sugar , plasma A.A. , vitamins , minerals , electrolytes , alkaline phosphatase , pancreatic enzymes , thyroxin , cholesterol and G.F.R.
- While the following data will be more than normal levels :
- Ketonuria, aminoaciduria, G.H., epinephrine and steroid.

Marasmic kwashiorkor

- State intermediate phase between marasmus &kwashiorkor when a previously marasmic child develops edema due to higher nutritional requirement

	Kwashiorkor	Marasmus
Age	1year	Any
Dietary history	Early cessation of bf	Delay weaning
Onset	acute	gradual
History of infection	Frequent	Uncommon
Body weight	60-80% of the ideal body wt.	Less than 60% of the ideal body wt.
Appetite	Poor	Good
Hair and Skin Changes	Common	Rare
Edema	Essential	Absent
Mental Change	Apathetic	Alert
Vitamin deficiency	Common	Masked
Hepatomegaly	Present	Absent
Hypoproteinemia	++/++++	+

Kwashiorkor Treatment

Step1: emergency phase (during 1st 24-48hr)

A. hypothermia due to less subcutaneous fat, infection, hypoglycemia, gradual warming with blanket, warmer with monitoring
B. Infection: empirical anti biotic indicate
C. Hypoglycemia: should be treated
D. Dehydration urine output is the most reliable indicator
   - Mild –moderate: 5-10ml/kg/hr with resomal
   - Sever with i.v fluid
E. Dys-electrolytemia: hypokalemia, hyponatremia, hypocalcemia, hypomag
F. Nutrient deficiency: vit A,IN 2ND Weak give iron
G. Congestive heart failure: due to
   1. Impaired cardiac function
   2. Fluid over load treatment with diuretic ,supportive measure

Step 2: dietary management

A. Calculate nutritional requirement: begin with 100cal/kg& 2gm/kg protein increase by 10-20% every alternate day until reach 150cal/kg of expected wt
B. Select of appropriate feed, frequency, mode of administration
C. Monitoring: a) dietary intake b) sign of recovery
D. Recovery complication: diarrhea, CHF

Sign of recovery

1. General improvement in appearance
2. Social smile
3. Return of appetite
4. Wt gain50-70gm/day
5. Disappearance of edema
6. Reduction of hepatomegaly
7. Increase serum albumin

Prognosis of PEM

- Permanent impairment of physical & mental growth if severe & occurs early especially before 6 months old
- First 48 hours critical, with poor treatment mortality may exceed 50%
- Even with thorough treatment, 10% mortality may still occur
- Some mortality causes are endocrine, cardiac or liver failure, electrolyte imbalance, hypoglycemia & hypothermia

Diseases of Nutritional Excesses

FLUROSIS
- Causes due to excess of Fluorine.
- Dental flurosis:
  o Teeth lose white color and shine.
  o Mottling of teeth.
- Skeletal flurosis:
  o Nerves are affected.
  o Back Pain.

OBESITY
- Product of Energy Imbalance
- Leads to undue weight on organs.
- Hypertension
- Heart Diseases
- Diabetes

Nutritional Disorders

- *Obesity*: body wt more than97th over wt or BMI 25, wt more than 120 % of expected wt or BMI`` more than 30
- In infant and children of normal weight, increase in adipocytes size account for most of increase in adipose mass during the first year of life. Obese children have larger fat cell size than normal weight controls children and may have increase in number of adipocytes.
- Obesity is based on the degree of excess fat.
- Normal (ideal) BMI ranges between 18.5 and 25.
- An average BMI of a population should be 21 or 22.
- Less than 18.5 denotes chronic under-nutrition.
- Between 25-30 considered as overweight.
- Above 30 indicate obesity.

Body Mass Index (BMI) $= \dfrac{Weight\ in\ Kilogram}{Height\ in\ meter^2}$

Obesity

- Appears most frequently in the 1st year, 5-6 years & adolescence

- *Etiology*:
    - Excessive intake of food compared with utilization
    - Genetic constitution
    - Psychic disturbance
    - Endocrine & metabolic disturbances rare
    - Insufficient exercise or lack of activity

- *Clinical Manifestations:*
    1. Fine facial features on a heavy-looking taller child
    2. Larger upper arms & thighs
    3. Genu valgum common
    4. Relatively small hands & fingers tapering
    5. Adiposity in mammary regions
    6. Pendulous abdomen w/ striae
    7. In boys, external genitalia appear small though actually average in size
    8. In girls, external genitalia normal & menarche not delayed
    9. Psychological disturbances common
    10. Bone age advanced

- *Complications of obesity:*
    A. *Cardiovascular complications: like hypertension , increase in serum cholesterol level*
    B. Hyperinsulinemia.
    C. Cholelithiasis.
    D. Blount disease or slipped capital femoral epiphysis. E- Abnormal pulmonary function tests.
    E. Pseudotumour cerebri.
    F. Sleep apnea.
    G. Psychological trauma

- *Treatment of Obesity:*
    A. **1st Principle:** decrease energy intake
        1. Initial med exam to R/O pathological causes
        2. 3-day food recall to itemize child's diet
        3. Plan the right diet
            a) Avoid all sweets, fried foods & fats
            b) Limit milk intake to not >2 glasses/day
            c) For 10-14 yrs, limit to 1,100-1300 cal diet for several months
            d) Child must be properly motivated & family involvement essential
    B. **2nd Principle:** increase energy output
        1. Obtain an activity history
        2. Increase physical activity
        3. Involve in hobbies to prevent boredom