

# [ Childhood nutritional disorders.]

[ Dr. Alsanie ]

**Done by:**

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**References:**

Doctor's slides ( no slides provided )+ notes, [if extra write it down]

Color index: [ **important** | **notes** | **extra**

**The lecture were divided into two parts , part 1 no slides were given, what is here is note taken from the doctor + part 2 ( slides were taken from 434 boys archive )**

## First part:

-Aim of each couple is having a healthy well-nourished child, in order to achieve this the baby needs healthy well-balanced diet.

-Our second aim is achieved satisfactory growth and avoidance of deficiency states in a child, so it is important to have balanced diet as nutrition plays a role in:

**1**-prevention of acute and chronic illnesses

**2**-development of physical and mental potentials

**3**-provision for preserve in case of stress e.g.: prolonged starvation we see that the only way to keep normal glucose level is by endogenous conversion of glycogen into glucose.

-Individual nutritional requirement vary with genetic and metabolic differences as you know a thin parent are likely to have thin children, same occurs in obese parents.

-To provide child with well-balanced diet, diet should contain sufficient amount of macro, micronutrients and fluids.

Macronutrients has big molecular weight >includes protein, **carbohydrates** and **fat**

Micronutrients >includes **mineral** and **vitamins**

## Proteins

- Accounts for **20%** of body weight, Important for cell protoplasm, tissue regeneration and tissue growth.
- Basic unit of protein is amino acids, so the type(kind), number and arrangement of the amino acid in the protein is what define the characters of protein.
- There are **24** amino acids in nature.
- 9 of them are essential (essential means body cannot synthesize them) which are: histidine, **isoleucine**, **leucine**, **lysine**, **methionine**, **phenylalanine**, **threonine**, **tryptophan**, and **valine** لازم احفظها
- Ingested proteins **by the action** of **pepsin** will convert protein to alpha amino acids and oligopeptides, HCL of stomach provide an optimal pH for the action of pepsin
- There is another enzyme which is the **chymo-pepsin** which converts Casein into para-casein
- Inside the intestine (small bowel) under alkaline medium, there are two enzymes **trypsin** and **chemo trypsin** which are secreted by pancreas which will converts oligopeptides into peptides, and inside the lumen there is another enzyme which is called **peptidase** which will converts peptides into amino acids
- No way for small bowel to absorb protein in a form other than amino acid inside lumen of SB, there is small portion of some small proteins are absorbed as it is, and it is the basic phenomena of antigen-antibody reaction

## Carbohydrates:

- Carbohydrates and fats are the main source of energy
- Accounts for **1%** only of body weight, especially in infants because infant liver size is 10% of adult liver size and muscle mass is 2% of adult muscle mass and those are the two organs where glycogen(carbs) get stored in the body.
- 80-98% of types of carbs present in diet are in the form of polysaccharide or starch
- Polysaccharide is breakdown by the action of **amylase** enzyme which secreted by two organs (salivary glands and pancreas) it will convert polysaccharide to disaccharide, we are having 4 types of disaccharide (lactose sucrose, maltose, isomaltose)
- Lactose by the action of **lactase** enzyme will be converted to glucose and galactose. in small bowel lumen

- Sucrose by the action of **sucrase** enzyme will be converted to glucose and fructose.
- Maltose and isomaltose will be converted into two molecules of glucose.
- And at the end we will have 3 types of monosaccharides: glucose, fructose, galactose.
- Glucose and galactose are actively absorbed so it needs energy, carrier molecules and receptors, while fructose it is passively absorbed, absorption takes place in upper 2/3 of SB.

## Fats :

- 98% of types of fat present in diet are in the form of triglyceride (three fatty acid molecules attached to of molecule of glycerol (mono-glyceride))
- So, the enzyme **lipase** converts triglyceride into three fatty acids and molecules of glycerol (monoglyceride)
- Then they will be absorbed in the SB, and then inside the enterocytes (cell of SB lumen) they will reunite again forming triglyceride, then will be carried by lymphatic system into liver where they get metabolized
- Three types of fatty acid short medium long chain, depending on number of carbon atom which ranges from 4-24
- 1g of Short >5.4kcal, 1g of medium >8.3kcal, 1g of long >9.3kcal
- **THREE** important essential fatty acids: linoleic acid (omega-6 group), linolenic, arachidonic
- Essential means >cannot be synthesized by the body, composed of 18 fatty acids, very important as they are precursor of prostaglandin and omega 3.
- Unsaturated needed for growth skin and hair integrity.

## Infant feeding:

- The most important period of life is the **first year of life**, in which human being achieve maximum growth.
- so, at the end of first year a normal infant who is growing normally he should triple his birth weight and 50% of his birth length
- So, if the birth weight of child is 3.3 > I will expect him to be at the end of first year should be 9.9 or 10 kg (\*3), and the birth length was 50 cm it should be 75cm (+50%)

successful infant feeding requires cooperation between mother and child, breast feeding should be initiated soon after birth, feeding should be scheduled every 2-4 hours in first few weeks of life. We should encourage mother to feed baby at frequent interval rather than waiting the baby to be asking for feed.

## Energy requirements for growth:

- In the **first week - one month** of life in order to a child to grow normally he need **30 kcal/kg/day** for growth then this starts to decrease with increasing months till he reaches **18 month** he need only **2 kcal/kg/day**
- focusing that it is kcal /day /kg

## Fluids:

- Very essential for weight and existence considered 2<sup>nd</sup> after oxygen, usually lack of water for few days means child will die, water content of infant is **higher** than adult which ranges between 70-80% of BW in contrast with adult 60-65%
- Water content is distributed 7% in intravascular, 18% interstitial. 45% intracellular compartment

- Daily consumption of fluid usually the same the infant needs **more fluid** compared with adult, usually daily consumption between 10-15% of BW in contrast with adult whose daily consumption 2-4% of BW
- Fluid requirements are related to caloric consumption, insensible loss, urinary specific gravity
- Source is from fluid intake in the majority, Small fractions come from oxidation of food, Mixed diet 100 kcal will give 12 ml of H<sub>2</sub>O
- Almost all water intake is lost > only small amount will be retained in the body, retention of fluid in the body ranges between 0.5-3% of fluid intakes which means it ranging between 9-23 ml/day
- loss of water occurs in **three** compartments:
  - 1-**Urine** accounts for 40-45% by action of kidney as it plays major role in homeostasis, increase lost are seen in cases of (diabetes mellitus, diabetes insipidus, intrinsic renal disease or hypercalcemia).
  - 2-**insensible losses** (skin and lung)
    - increase lost are seen in cases of (when we lose barrier prevent. 1- Evaporating of fluids deep burns where we lose epidermis , severe dermatitis , fever , phototherapy ( type of light given to new born in case of unconjugated hyper-bilirubinemia in which the lights converts unconjugated to conjugated bilirubin to be secreted in urine , any light add 30ml/kg/day ( more than the requirement because we are expecting child to lose more fluid through skin)the we add 15ml/kg/day for each additional light. Single add 30ml/kg > second add 15 (45)> Triple add 15 (60)
- Any condition causing losing of fluid through lungs, such as: any condition causing tachypnea or respiratory distress, infections, asthma, hyperactive airways disease

3- **Fecal loss** accounts-10% of fluid loss, increase in cases of diarrhea, child with diarrhea they have sooner dehydrated than adults > need more fluid

- Loss in the body by any condition that cause interruption in oncotic or hydrostatic pressure ‘
  - Oncotic keep fluid inside vascular
  - hydrostatic from intra to interstitial
  - oncotic main factors are serum albumin or protein
  - hypoalbuminemia >edema as a result of low oncotic pressure
  - anything increases hydrostatic will also cause edema

### Daily fluid requirement

- we are having two important ways to calculate fluid requirement
  - 1<sup>st</sup> By (Body surface area) >1500ml per square meter /day
  - 2<sup>nd</sup> body weight> according to step: first 10 kg we give 1000ml/kg/day, then anything above 10kg add 50ml/kg/day, above 20 we give 20ml for any weight above 20 kg
- Fluid requirement in new born infants** :we should be very careful not to over hydrate the baby especially in first 3 days of life ,because they have retention of fluid due to many factors like compression of birth canal as well as stress of infant or fetus > allow time to get rid of this fluid they have retention in the **1<sup>st</sup> day** give between 60-70 ml/kg/day, **2<sup>nd</sup> day** we give 75-80 ml/kg/day, **3<sup>rd</sup> day** we give 80-100 ml/kg/day so at the 4th day we start giving normal requirements

### -Fluid requirement may increase under certain conditions:

- 1- Very low birth weight need more than 100ml/kg/day >> because no subcutaneous fats which means more fluid will be lost from skin >needs more fluid
- 2-encephalocele



3- gastroschisis

4-phototherapy

## Calories

### -What is the definition of kcal?

the amount of heat required to raise the temperature of one kg of water from by one degree Celsius (or one kelvin).( from 14.5 to 15.5 degree centigrade)

### -Daily caloric requirements:

the first year of life is the most important so needs more calories 100-120kcal/kg/day > usually decrease by 10 kcal for each succeeding 3 years after and so on (90-10)

-**The source of energy** is from macronutrient> proteins, carbohydrates, fats

1g of Carbs will give 4kca, mg of protein > 4 kcal, protein is very important for tissue regeneration and tissue growth and this is the cause we utilize protein not to have energy

Proteins should be 10-15% from the daily caloric requirements while carbs and fats are the main source  
Carbs 40-45% of daily caloric requirements, fat 35-45%

### -Then after child takes the calories were does child spend these calories.

Usually 50% of caloric intake will be spent for the maintenance of BMR ,25% for physical activity ,12% for the growth ,8% for fecal losses (lost as form of fat globule in stool) 5% for Thermic effect of food

**What is thermic effect of food?** the calorie for ingestion and assimilation of food

**What is BMR** >measured at room temperature, which is 20, 10-14 h after food while child is complete physical emotionally quiet

-**Caloric requirements:** Normal child requires in first year of life **110 kcal/day** ·this decreases till adolescents or adult life where child needs 50% of what needed in first year of life

-Proteins: Normal child requires in first year of life 2-2.5g of proteins which decrease till it reaches only 1 g

-Vitamins: normal child needs more vitamins as he grows, for example vitamin A in first year of life a child needs 1400lu, then needs 4000, vitamin D 1400 , vitamin E and C increase requirements with age  
ما يحتاج اعرف كم بس احتاج اعرف انها تزيد مع العمر

-You find that commercial milk formula claims that it is fortified with iron and vitamins by child requires more.

## Breast feeding:

-Human milk is natural food for a full-term infant during the first 6 months of life, that means if the child is on exclusive breastfeeding for 6 months, they will not suffer from any deficiency states as breast milk provides all the requirements needed.

### -lactation reflexes

We have two important hormones

- 1- prolactin AKA Milk secretion protein, from ant pituitary, prolactin acts on milk producing alveoli to cause milk formation, has mother action inhibits ovulation > that's why lactating. Either do not get pregnant

- 2- oxytocin AKA Milk flow hormone, acts on myoepithelial cells causing easy flow of milk to mouth of baby, reflexed are found on nipples of breast when a child sucks a nipple > goes through vagus to> stimulate post pituitary gland grand to secrete oxytocin to cause easy flow of milk to the baby

-successful breast feeding requires cooperation between mother and child, for example the mother should supports her breast to facilitates, clean it, play with child, ensure flow is achieved for the mouth of aby

### **Breast milk vs cow milk:**

- **Water** content – same
- **Caloric** content -same > each 100 ml will provide 67 kcal
- **protein** content is more in cows 3 times more than human milk, but protein quality is better in human, in cow contains mainly casein which is difficult to be digested>absorption, while human milk contains lacto-albumin, lacto-globulin-lactoferrin
- **fat quantity** is same, but quality is different as human milk contains unsaturated fatty acids which is easily digested,
- **Carbohydrates** more in human milk in comparison of breast milk, mainly the lactose which is di - saccharide
- micronutrients=minerals are more in cow milk > risk of hypernatremia hyperkalemia and hypocalcemia (why hypocalcemia although more calcium? Bc of the Phosphate which combines with calcium and prevents its absorption)
- **iron** same
- **All vitamins** more in humans, only exception is vitamin K (which is more in cows' milk), if baby is breast feeding, they give IM vitamin K soon after birth to decrease HDON hemorrhagic disease of newborn  
so, we should not give cow as it is >> they treated cow milk to reduce minerals and fortified it with vitamins > Humanized type cow milk> decreed mineral component

**colostrum** اللبأ vs **mature:** first type of milk secretion in first few days after birth, has a deep lemon-yellow color, has alkaline reaction, higher specific gravity than mature milk, contains more proteins and minerals in contrast with mature which contains more carbs and fats

### **Advantages of breast feeding:**

- 1- does not need to be fortified with minerals in contrast with humanized type bottle feeding
- 2- available
- 3- same temp as body temp
- 4- mainly sterile
- 5- contains bacterial and viral ab
- 6- higher conc of IGA immunoglobulin > reduce risk of URTI and gastroenteritis
- 7- contains macrophages and lysozymes enzymes
- 8- contains lacto-ferrin (iron binding protein) >inhibits growth of pathogenic E coli
- 9- growth promoting factors > enhance growth of non-pathogenic microorganisms and inhibits pathogenic microorganisms

### Contra-indications for breast feeding:

if continuation of breast feeding will affect the health of mother > advice to stop breast feeding till this problem subsides > she resumes

Mother point of view	Baby point of view
<p><b>solid:</b> in mother having</p> <ol style="list-style-type: none"><li>1- septicemia</li><li>2- nephritis</li><li>3- profuse hemorrhage</li><li>4- eclampsia</li><li>5- typhoid fever</li><li>6- severe neurosis, postpartum psychosis</li><li>7- HIV (Can be secreted e in breast milk and the child can contracts HIV infection)</li></ol> <p><b>Relative:</b></p> <ol style="list-style-type: none"><li>1- <b>Acute febrile illness</b></li><li>2- <b>Fissuring crackling of nipple</b></li><li>3- <b>Mastitis (if subside resume</b></li></ol>	<ol style="list-style-type: none"><li>1- <b>metabolic diseases)</b> where any offensive substances cause the metabolic problem is found in human milk for example PKU phenyl ketone urea or galactosemia</li><li>2- <b>digestive problems</b> such as primary lactose intolerance or glucose galactose malabsorption (why? they are mono that both should be absorbed need active absorption &gt; they need fructose</li></ol> <p>lactase enzyme cannot be given because acts under alkaline medium (destroyed by stomach)</p>

### Formula

there are specific formulas for certain conditions, as if

- baby has intolerance for cow's milk protein > we should withdraw cow's milk proteins and substitute with soybean protein
- if child need more energy, we should give Medium chain triglyceride MCT > which can easily be absorbed and provides more energy
- we can reduce mineral content and fortifies it with vitamins
- Preterm baby has less mature organs (pancreas and liver > not secreting digesting enzyme) >> we provide them with amino acids for digestion and absorption
- Lactose free formula if having lactose intolerance

Encourage BREAST FEEDING ☺

There is a risk of aspiration ,choking and rub of frenulum of tongue > if brother is feeding his brother  
(حاط صورہ لآخ یرضع اخوہ))

## Second part:

I combined notes with slides found in boy 434 archive





# **Childhood Nutritional Disorders**

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- Three important topics

# " Nutritional Disorders"

Protein energy mal-nutrition

## 1. Under nutrition PEM.

Which means under nourished because of deficiency of proteins.

There are deficiency of protein alone , energy alone , combined

## 2. Vitamin deficiencies.

## 3. Over nutrition (obesity).

لا تعني ان الطفل صحيح زي ما يعتقد المجتمع

# Protein – Energy Malnutrition

- A range of pathological condition arising from coincident lack of proteins & calories.
- It is commonly associated with infection.
- It occurs in infant or young child if :-
  - He has been given an inadequate diet for several weeks. - After. Prolonged inadequate diet
  - He has suffered several attack of diarrhea. -which causes lack of absorption
  - He has been ill with serious infection.

## Prevalence :

- Very high affects > 100 Million children worldwide
- Has high morbidity & mortality rate.





# P. E. M .

## Type and classification :

- **Degree** :Where we rely on (weight according to age )
  - **Mild**
  - **Moderate**
  - **Severe**
- **Types (Severs) :**
  - **Marasmus** Only energy deficiency
  - **Marasmic kwashiorkor** Deficiency of both energy and proteins
  - **Kwashiorkor** Mainly protein deficiency
- **Gomez :**

**Percentage of expected weight for age**

  - **Normal > 90%**
  - **Moderate 74-60%**
  - **Mild 89-75%**
  - **Severe <60%**



# P.E.M (Cont...)

**Welcome :**

% of Wt./ Expected Wt.

80% of expected wt.

No Edema

Under wt.

Edema

Kwashiorkor

60% of expected wt.

Marasmus

Marasmic  
Kwashiorkor



- Marasmus = **wasting** of the muscles and subcutaneous tissue and no edema

Ghana language bc first case was discovered in Ghana

- Kwashiorkor = Ga language of . With edema.  
The disease of the first child when the second is on the way. Because while the mother is breast feeding there isn't any deficiency and once she weans her child she starts him on starch formula the infant will acquire protein calorie deficiency.

They call it disease of second child > when she gets pregnant with the second child she weans the first baby from breast feeding > starch formula which lack protein

- Wasting – weight for height

0 = >90%, 1 = 90-80%, 2 = 80-70%, 3 = <70%.

- Stunting – height for age.

0 = >95%, 1 = 95-90%, 2 = 89-85%, 3 = <85%.



# BIRTH

# PATHOGENESIS

Early weaning ends with Marasmus most of the time ( first year of life), while late weaning ends with kwashiorkor.(end of first year or second year )

Breastfeeding



12/12

Early weaning

5/12 In the first 5 months of life as baby is getting breast feeding there will be no problems

Late weaning

Dilute dirty formula Contains less calories

Starchy family diet

Repeated infection (GE)

Starvation therapy Baby seperated from mother >stavation

Acute infection

Malnutrition

Marasmus



M.K.



Kwashiorkor

# P.E.M

## (Cont...)

Pathogenesis : Factors enhance occurrence of malnutrition

**1. Economic factors.** Poor cannot provide good nutritional support

**2. Social factors.** Big family where mother cannot focus on baby

**3. Medical factors in mother preventing her from breast feeding.**

**4. Various disease.** Such as gastroenteritis > maldigestion > malabsorption

- Decrease absorption.
- Increase losses.

**5. Increase metabolism.**

Where child needs more energy as in fever > increases caloric requirement > each 1 degree centigrade raise in temp > need additional 10kcal /day more than daily caloric requirement

# Pathology

## PEM affect almost all systems :

Bc of decrease in oncotic pressure as a result of hypoalbuminemia

- **TBW increased → increased ECF → oedema (increased oncotic pressure due to lack of protein.**
- **Minerals – K decreased, Na Ca, PO4 decreased.** Hypoelectrolytemia !
- **Pancreas :** As mentioned protein is very essential for tissue regeneration and growth
  - Mild atrophy.
  - Exocrine secretion decreased.
- **GIT – Mucosa, absorption, enzymes.** Enzyme deficient , failure to absorb fluid as a result of edema

**Lactase → Lactose intolerance. Lactase decreases because of**

**repeated infections and causing diarrhea.**

Repeated infection > sloughing of mucosa > lactase deficiency > not able to metabolize lactose > lactose intolerance

- **Liver – fatty liver.**

Bc

# Pathology (Cont...)

- **Infection :**

- Decrease Immunity.

- CM1.

- Secretory 1gA

- Sites :

- Lungs, UTI, septicaemia.

- Types – Gram negative organism are more common in malnourished children as opposed to normal children where gram positive are more common.

- **Brain changes :**

- Tremor, depression, apathy**





# Pathology

## (Cont...

- **Endocrine :**

- Increase GH, TSH and Cortisol.
- Decrease insulin, T3 and T4.

Increase in stress dependent hormones because of malnutrition is causing repeated infection and stress

- **Haematology :**

Depend on which is deficient

- RBC → low. Any type of anemia can occur.
- WBC → normal or high because of infection
- Platelets → low.
- Coagulation → abnormal. Because the

coagulation factor's precursors are proteins.

# P.T.M.

## Kwashiorkor :

- Occurs <sup>9 months</sup> 9/12 – 2 years.
- Appearance - sugar baby (moon fat face looking well while this is due to edema).
- Growth failure.
- Oedema.
- Skin Cheilosis, stomatitis.
- Hair changes **flag sign** (hair loss and hair growth interruption making the hair in 3 different colors. مهمه)
- Psychomotor changes - irritable, apathetic tremor, depression, CNS affection



# P.E.M.

## Kwashiorkor : (Cont...)

is not common on SA because when we wean the child we give wheat containing formula (biscuit and bread which is rich in protein.)

Common in south eastern asia , latin america , africa > they rely on rice instead of wheat > have very little amount of protein

- **CVS – circulatory insufficiency due to hypovolemia resulting from shifting of fluid due to low oncotic pressure.** Two organs affected > renal and liver
  - **Renal – decrease GFR.** It cause renal insufficiency
  - **Anaemia.**
  - **Oedema.**
  - **Moonface.**
  - **Hypoalbuminaemia.**
  - **Fatty liver due to compensation of the liver by increasing the cholesterol synthesis in response to low protein levels.**

## Marasmus

- Occur at any age.
- Commoner than kwashiorkor in S. A.
- Wt. is less than 60% of expected wt. for age.
- No oedema because its only energy deficiency not protein therefore no decreased oncotic pressure.
- No dermatosis & hair changes no flag signs

# P. E. M .

## Signs and symptoms for both :

- **Clinical presentation of PEM varies with :**
  - Degree & duration of protein and energy depletion.
  - Age of individual.
  - Associated vitamins, mineral and hale element deficiencies.

Cont...



# P. E. M .

•The main features are :

## 1. Growth failure

- Slowing or cessation in linear growth.
- Slowing, cessation or loss of weight.
- Decrease in mid-arm circumference due to muscle wasting.
- Delayed bone maturation.
- Diminished skin fold thickness.

Cont...

# P. E. M .

•The main features are : Cont...)

## 2. Infection :

- High rate of infection particularly **gastroenteritis, measles & pneumonia.**

Under risk of gram negative micro-organism , while normal child gram positive ( put this in mind when considering giving abx to malnourisedh child) bc of affection of immune system as a resilt of lack of prtoen > immunoglobulin , affect bothe humroal and celleualr

- In tropical areas :-

Increase rates of malaria, hookworm and schistosomiasis infestations.

Cont...





# P. E. M .

The main features are : Cont...)

## 3. Anaemia

- Lack of iron, folic acid & other vitamins.

Hypochoemic , normo , micor , macro ...etc

- Every morphological types in peripheral blood smear.
- Bone marrow → Hypoplasia.
- Iron deficiency & megaloblastosis in bone marrow.



Cont...

# P. E. M .

- The main features are : Cont...)

## 5. Skin and hair changes :

Especially in kwashikor or marmasmuic kwashikor

- Mucous membrane cheilosis, stomatitis.
- Skin dermatosis, decrease or increase pigmentation, desquamation.
- Hair, interrupted hair growth flag signs.

# P. E. M .

- The main features are : Cont...)

## 6. Oedema :

- Can be :-

- Mild → involving lower limb. subcutaneous

- gross → affecting every part of the body. Within the body>ascites  
pleural,pericardial effcion  
Depending on severity of  
albumin defeciency

- Rarely results into effusions into serous cavities  
i.e., peritoneum, pleura, pericardium.

- Oedema fluid may represent 5-20% of body wt.

# P. E. M .

- The main features are :

## 7. Muscle wasting

Best determined by

- Mid arm circumference reduced.
- Skin fold thickness reduced.
- Child is weak, hypotonic & unable to stand or walk.



# Diagnosis

- **History, nutritional history** type of milk, frequency of feeding , time of weaning, substance weaned on.type of food , age of feeding
- **Examination.** Also look for signs of infection or clinical manifestations of malnutritions
- **Laboratory.**
- **Anthropometry** Plot it in growth chart
  - **Weight.**
  - **Height.**
  - **Head circumference.**
  - **Mid arm circumference.**



## Diagnosis (Cont...)

### • Lab. Test :

- CBC, Hb and blood smear.
- Albumin.
- U & E, Glucose: hypoglycemia due to low glycogen stores, Ca.
- Infection screening.
- Prothrombin time.
- Mantoux test because the child has low immunity and might get T.B. Especially if endemic area



# Treatment

## Prevention is the best cure

- Mild PEM: we do not need to admit the child, we manage him as an out-patient.
- : O. P. RX

### 1. Nutritional advise.

- Protein 2-3 gm/kg/day we increase it above normal up to 3 (normal is 2). Increase protein
- Energy 100-150 kcal/kg/day we also give above normal levels,

### 1. Vitamin supplementation.

Vit. S, D, B, C and Iron.

**We calculate the need according to the expected wt (triple the birth wt) and not the current wt**

because if we did the child will fail to catch up in his growth. We give it slowly to allow the child

**to adopt.**

For example if child is 1 year and his age is 6 kg ,we should provide him with energy according to 10 kg ,bc we are expecting a 1 year child to be 10 kg



## Treatment (Cont...)

- **Severe PEM: admit to hospital and**

### 1. RX of complication

- Dehydration.
- Hypoglycemia.
- Infection.
- Electrolyte imbalance.
- Anemia.
- Hypothermia.

### 1. RX of malnutrition.

- Dietary :
  - Energy & protein.
  - Elemental diet. TPN In case of severe mucosal problems in small bowel >severe
  - Vitamins, iron and folate.

# Obesity

## Definition :

A generalized excessive accumulation of fat in subcutaneous and other tissues as a result of increase in the number or in size of fat cells adipocytes.

**NB : in the 1<sup>st</sup> 2 y the Number of the adipose cells will increase after 2 y the size will** مهمه

Which means increase in size is easy to be controlled if you give low calorie s diet , but if increased in number no way to get rid of that ! , so thats mean an obese child in first 2 years of life is very likely to be obese as adults



# Obesity

## Causes :

- **Excessive food intake increase appetite due to :**
  - 1. Psychological disturbances.**
  - 11. Hypothalamic, pituitary problems.** Bc of satiety center is lying in that area > increase need for food
  - 111. Hyperinsulinism.**
- **Lack of activity and exercise**
- **Genetic predisposition.**
- **Some inherited syndrome such as :**
  - **Prades-willi syndrome.**
  - **Laurance-moon-Biedl syndrome.**
  - **Cushing syndrome.**

# Obesity

## Clinical Manifestations :

- **Commonly occurs in the first year of life, at 5-6 yrs. & during adolescence.**  
Common in those three ages why > first year of life child cannot control himself where is he fully dependent on mother if mother gives a lot he will become obese , 5-6 school entrance where change of environment occurs >psychological problems >increase appetite , **adolescence** as a effect of sex hormone
- **Heavy & tall child with advanced bone age.**
- **Striae on abdomen.**
- **Male external genitalia appear disproportionately small but actually are of average size.**

Penis gets embedded in the subcutaneous fat in suprapubic region

# Obesity

## Complication :

### 1. Psychological :-

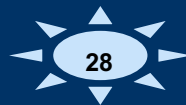
- **Social isolation**, Especially in school, avoid sport they do not want to wear sports clothes
- **Poor parent-child & child-peers relationship.**
- **Marital dissatisfaction.**

### 2. Greater risk for adult obesity.

### 3. Orthopaedic problems, genuvalgum and slipped capital femoral epiphysis.

### 4. Impairment of cardiorespiratory function.

- **Hypoventilation pickwickian syndrome.**



# Obesity

## Complication : Cont.)

### 5. Predisposition to serious diseases : In adulthood

- **Diabetes mellitus.**
- **Atherosclerosis.**
- **Hyperlipidaemia**
- **Ischaemic heart disease.**
- **Hypertension.**

# Obesity

## Diagnosis :

- **History.**
- **Growth parameters.**
  - **Weight.**
  - **Height.**
  - **Skinfold thickness.**

# Obesity

- Counseling of the whole family. If having only 1 obese child very difficult to treat bc you cannot isolate the child
- Behavior and life style modification.
- Exercise.
- Well balanced low caloric diet.
- Regular follow-up.

What we usually do we ask family we do encouragement to weight child and encourage him by stars > gifts and so on



# Signs of Nutritional Disorders & Their Interpretation

	<u>Signs</u>	<u>Associated Disorders</u>
1. Hair	<ul style="list-style-type: none"> <li>• Flagnsign</li> <li>• Dyspigmentation</li> </ul>	<ul style="list-style-type: none"> <li>• Kwashiorkor</li> </ul>
2. Face	<ul style="list-style-type: none"> <li>• Nasolabial desquamation</li> <li>• Moon face</li> </ul>	<ul style="list-style-type: none"> <li>• Riboflavin</li> <li>• Kwashiorkor</li> </ul>
3. Lips	<ul style="list-style-type: none"> <li>• Angular stomatitis</li> <li>• Chellosis</li> <li>• Angular scar</li> </ul>	<ul style="list-style-type: none"> <li>• Riboflavin</li> </ul>
4. Eyes	<ul style="list-style-type: none"> <li>• Pale conjunctivae</li> <li>• Corneal xerosis</li> <li>• Kerato malacia</li> <li>• Bikot's spots</li> </ul>	<ul style="list-style-type: none"> <li>• Anaemia</li> <li>• Vit. A</li> </ul>
5. Nails	<ul style="list-style-type: none"> <li>• Koilonychia</li> </ul>	<ul style="list-style-type: none"> <li>• Iron</li> </ul>

## Associated Signs

## Disorders

- Hypotonia
  - Craniolobes
6. Musculo-skeletal
- Frontal & parietal bossing
  - Epiphyseal enlargement
  - Rachitic roasary
  - Spongy bleeding gums
7. Gums
8. Glands
- Thyroid enlargement



### Vit. D

In child > ricket  
 Adult > osteomalcia WHY ? Bc ricket is diesase of growing bone where there is deminerlization , osteomalcia in already grown bone

- Vit. C
- Lodine

### In rickets :

- **craniotabes** : Softening of skeletal bone, if you go just above ear and press on skeletal bone it will be compressable and if you relase your hand it will come back
- They will **bowing** of bones
- **Rachitic rossary** سرجة enlargement of bone at the attachement of ribs with sternum