Pediatric Nursing

Nutrition

Lecture '4'
General Concepts in Nutrition

- **Nutrition**: refer to taking in food & assimilating for use by the body.

- **Macronutrients**: the major building block of the body, which are carbohydrates, proteins, and fats.

- **Micronutrients**: substance needed in small quantities for healthy body functioning, such as vitamins, minerals.
Nutrition

- The amount of nutrients needed depends on:
  - Activity level.
  - State of health.
  - Presence of disease.
  - Age-related needs.
Nutritional needs:

- Support the growth & development of the child.
- Influence the child’s progression along the developmental path.
- Maintain the child’s health.
- Foster the state of maximal potential or health promotion.
Infancy

- Infant have an extremely fast rate of growth e.g. (weight doubled at 6 months and tripled at 12 months).

- And their activity level is high, which lead to high caloric intake.

- But they have small stomach size, & immature digestive system.
Infant’s Feeding

- The first food to be introduced to the infant is milk.

Types of feeding

- Breast Feeding
- Bottle Feeding
Breast Feeding

- It is recommended for the first 6 months of age.

- It has several advantages for both infant and mother.
Formula Feeding

- Is an alternative for breast feeding, called bottle feeding.

- It has three types:
  - Ready to use.
  - Concentrated.
  - Powder.
<table>
<thead>
<tr>
<th>Formula preparation</th>
<th>How backed</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready to feed</td>
<td>Bottles or cans</td>
<td>No preparation needed</td>
<td>Expensive</td>
</tr>
<tr>
<td>Concentrate</td>
<td>Cans</td>
<td>Easily prepared, add water only</td>
<td>Can be incorrectly measured</td>
</tr>
<tr>
<td>Powder</td>
<td>Cans</td>
<td>Least expensive</td>
<td>Can be incorrectly measured</td>
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Formula milk contains 9% -12% cal, 45-55% of it is lactose carbohydrate & 10% is fat.
Contents of formula

Types of Formula According to its contents

- Milk-based
- Soy-based
- Elemental
Formulas

• The **milk-based formula**: is used for average newborn.

• The **soy-based formula**: is used for newborn who are allergic to cow’s milk protein.

• The **elemental formula**: which contents are modified (fat, carbohydrate, proteins). It is used for newborn who are lactose intolerance or galactosemia.
Calculating formula's adequacy

• To calculate adequacy of formula, remember two rules.
1- The total fluid ingested for 24 hours must meet the infant's needs (150-200 ml/Kg/day).

2- The number of calories requires per day is (100-120 Cal/Kg/day).
Question 1

- Eman is 3 months of age, her mother ask you about the needed amount of formula milk that Eman must take per day?

- Knowing that Eman’s weight is 5 kg.

\[
150 \times 5 = 750 \text{ ml / day.} \\
750 / 8 = 94 \text{ ml per meal}
\]
Question 2

• Mona is 6 months of age, her mother asks you about the needed amount of calorie that Mona must take per day?

• Knowing that Mona’s weight is 6 kg.

100 * 6 = 600 cal / day.
600 / 8 = 75 cal per meal
Is the baby get enough formula

The infant is getting enough formula if he or she is:

• Has 6 or more wet diapers in a 24 hours period.
• Sleeps between feedings.
• Has more than 2 bowel motions each day.
• Has had increase in weight.
Nutritional allowances for infant

- **Calories:**
  up to 2 months $\rightarrow$ 110-120 cal/Kg/day.
  one year $\rightarrow$ 100 Kcal/Kg/day.

- **Proteins:**
  it is necessary for the formation of new cells.
  - Birth - 6 months: 2.2 g/Kg/day.
  - Above 6 months: 1.6g/Kg/day
    (it is provided by both formula & breast milk)

### unaltered cow's milk
is not recommended.
Cow's milk will create a rich solute load (amount of urea & electrolytes that must be excreted by urine) because it contains high amount of protein (16% while breast milk is 8%) that newborn's kidney could be overwhelmed by it.
Fat:

- Linolic acid; an essential fatty acid for growth & development & skin integrity of infant.

- Mother should not use fat-free formula for the infant (it has half amount of fat needed).
Carbohydrates:

@@ Lactose is very important for:

1- It is the most easily digested of carbohydrate.
2- It improve calcium absorption & aids in nitrogen retention.
3- Its produce stool consisting of gram positive rather than gram negative bacteria. **Why??**

**It decrease the incidences of gastrointestinal diseases (which results from gram-negative bacteria).**
 @@ Lactose is very important for:

4- Adequate lactose also allows protein to be used in building new cells.

5- Lactose encourage normal water balance.

6- Prevent abnormal metabolism of fat.
Fluid

@@ Its very important to maintain a sufficient fluid intake in newborns because :-

1- Metabolic rate of infant is so high.
2- Newborn body surface area is large in relation to body mass, so loss of water by evaporation is much than adults.
3- kidneys of newborn are not yet capable of fully concentrating urine, so infant can not conserve body water as adults.
4- 30% - 35% of body weight of baby is extracellular fluid while in adult is about 20%, so if any loss of fluid occur (e.g. diarrhea), 35% of newborn's fluid components may be lost.

### Amount needed - (150 - 200 ml)/kg/d

Including breast & formula milk, excluding water & juices (because it is protein free).
Minerals

1- calcium:
• It contributes to bone growth, prevent the occurrence of tetany in children.

2- Iron:
• Infant has an iron store enough for the first 3 months of age.

- Birth- 6 months: 0.27 mg/Kg/day.
- Above 6 months: 11 mg/Kg/day
Fluoride

Necessary for building teeth and preventing tooth decay so:

1- The mother should drink water rich of fluoride during pregnancy, and breast feeding

2- The formula milk should prepare with water includes fluoride.
Vitamins

- Not necessary for supplement

- Just expose the baby for sun rays daily to encourage absorption of vitamin D

- If baby complain of vitamin D deficiency the mother should given 400 u\d.
What is weaning?

Weaning is the term used to describe the process of switching a baby:

- From breast-feeding to bottle-feeding.
- From breast or bottle feeding to solid food.
Introduction of supplementary food

- The American academy of Pediatrics recommends introducing semisolid food at 4-6 months (2004).

1- Because breast or bottle milk provides infant with needed nutrients at first 6 months; then supplementary nutrients are needed (rich in iron)

2- Because this age is appropriate for swallowing non-liquid food, extrusion reflex disappear.

3- The child can sit with or without support.

Miss.kamlah ahmed
<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Rationale</th>
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<tbody>
<tr>
<td>Introduce rice cereal at 4-6mo</td>
<td>Easy to digest, has low allergic potential, contains iron.</td>
</tr>
<tr>
<td>Introduce fruit or vegetables at 6-8mo.</td>
<td>Provide needed vitamins. Good source of vitamin C</td>
</tr>
<tr>
<td>Introduce meat at 8-10mo</td>
<td>Its harder to digest, have high protein load, given when kidney is mature. good source of iron</td>
</tr>
<tr>
<td>Use single prepared food rather than combination meals</td>
<td>combination meals contains more sugar, salt</td>
</tr>
<tr>
<td>• Introduce one new food at a time, waiting one week to introduce another.</td>
<td>• If food allergy or intolerance occur it easy to detect.</td>
</tr>
<tr>
<td>• Delay egg, nuts, corn, fish, strawberries until close to one years.</td>
<td>• the food listed are those mostly associated with food allergy.</td>
</tr>
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</tr>
<tr>
<td>Infant can be feed mashed table food like potato, carrots &amp; rice.</td>
<td>It is less expensive than ready packed one.</td>
</tr>
<tr>
<td>Avoid adding sugar, salt, spices when preparing baby food</td>
<td>They may got too much sodium from salt or have gastric distress from spices</td>
</tr>
<tr>
<td>Food that needs chewing, must be started at 7-9 months</td>
<td>Chewing movements starts at this age, not before.</td>
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## Infant nutritional patterns

<table>
<thead>
<tr>
<th>Ages</th>
<th>Patterns</th>
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<tbody>
<tr>
<td>Birth–I month</td>
<td>Eats every 2–3hrs, (60–90)ml/feeding</td>
</tr>
<tr>
<td>2 – 4 months</td>
<td>Eats every 3–4hrs, (90–120)ml/feeding Has coordinate suck-swallow.</td>
</tr>
<tr>
<td>4 – 6 months</td>
<td>Eats 4 meals/day, (100–150)ml/feeding Begins baby food, usually rice cereal.</td>
</tr>
<tr>
<td>6 – 8 months</td>
<td>Eats 4 meals/day, (160–225)ml/feeding Eats rice cereal, fruits, vegetables.</td>
</tr>
<tr>
<td>8 – 10 months</td>
<td>Eats 4 meals/day, (160)ml/feeding. Enjoy soft finger foods.</td>
</tr>
<tr>
<td>10 – 12 months</td>
<td>Eats 4 meals/day, (160–225)ml/feeding Eats soft table food, egg yolk</td>
</tr>
</tbody>
</table>
Important rules in weaning

• Weaning to regular food must be **gradually**, so the baby will not express any gastric disturbances.
• Do not start weaning during **summer** season This cause the baby to have dehydration
• Weaning should not be started when the baby is **ill**.
• Keep in mind the **hygiene** of food given to the baby.
What is malnutrition

• **Malnutrition**:- Is defined as a pathological state resulting from relative or absolute deficiency of one or more essential nutrients.

• Its *primary* when there is deficiency of food available or *secondary* when food is available but the body cannot assimilate it for one or another reason.

• Mostly its common in children between age of 3 months and 3 years.
Etiology for primary malnutrition

1- Failure of lactation.
2- Improper weaning practices.
3- Poverty and parental illiteracy.
4- Food taboos.
5- Death of mother (bottle feeding).
6- Lack of family planning.
Etiology of secondary malnutrition

1- Lack of immunization, having disease (diarrhea)
2- Congenital disease e.g. cleft palate.
3- Malabsorption, e.g. lactose intolerance.
4- Metabolic: Inborn errors of metabolism.
5- Infections: tuberculosis.
Malnutrition is clinically classified into

- **Kwashiorkor**: Its caused by a diet primarily deficient in proteins with an adequate amount of calories.

- Weight loss may not be much prominent in Kwashiorkor because the loss is heralded by edema.

- **Marasmus**: Its caused by a diet deficient in calories and protein
Pathophysiology of Kwashiorkor

Protein deficiency in both quantity and quality, which is very important in tissue growth and cell repair so all body systems affected and rapidly growing cell as epithelium and mucosa damaged.
Clinical features of Kwashiorkor

1- Generalizes edema more marked in lower extremity.
2- Irritability (brain is affected).
3- Thin, dry, coarse hair with alopecia and hair loss.
4- Anemia.
5- Dry skin with paint dermatitis (vitamins deficiency).
6- Blindness, specially night blindness (vitamin A).
7- Skin rashes.
8- Delay in wound healing (immune systems deficiency).
9- Potassium decrease, Na increase.
10- Mineral deficiency.
11- Enlarged of liver (fatty changed).
Clinical features of Marasmus

1- Marked muscle wasting and loss of subcutaneous fat.
2- Monkey face.
3- Skin becomes loose and hangs in fold (flabby and wrinkled)
4- Temperature is subnormal.
5- Look like old child.
6- No vitamin A deficiency.
Complication of malnutrition:

1- Hypothermia
2- Hypoglycemia
3- Cardiac failure
4- Infection
5- Vitamin A deficiency
6- Severe anemia
7- Dermatitis.
Treatment of malnutrition

Follow WHO guidelines:-
1- Treat\prevent hypoglycemia
2- Treat\prevent hypothermia
3- Treat\prevent dehydration
4- Correct electrolyte imbalance
5- Treat\prevent infection
6- Correct nutrient deficiency( protein . Minerals ,etc)
7- Initiate refeeding
8- Provide sensory stimulation and emotional support
9- Facilitate catch-up growth
10- Prepare for follow up after recovery
Feeding disorder of infancy

• **Failure to thrive (FTT):**
  - A syndrome in which infant and young children fail to eat enough food to be adequately nourished.
  - 5-10 % of the low birth weight is affected.
  - It caused by organic problem (AIDS), inborn error in metabolism, neurological diseases, esophageal reflux.
  - It characterized to no weight gain, or weight loss, irritability, fall under expected growth pattern, delay in mental development.
Continue...

Treatment:

• Include hospitalization to monitor the child feeding & sleeping pattern, induce food as needed.

• Weight daily, to monitor any change.

• Monitor child intake, output.
• Educate parent about the condition.
Anorexia Nervosa

• Is a life threatening eating disorder affecting teenage girls and young women.

• Cultural emphasis on thinness may contribute to the over concern of dieting, body image, & fear of becoming fat.

• Often a significant life stress, loss or change precede the onset of anorexia.

• Associated with history of abuse, obsessive compulsive disorders, anxiety disorders.
Clinical manifestations

- Extreme weight loss.
- Engage in lengthy & vigorous exercise.
- Use laxatives or diuretics to induce weight loss.
- Cold intolerance.
- Dizziness, constipation, abdominal discomfort.
- Irregular menses or amenoria, malnutrition.
- Decrease bone density.
- Fluid & electrolyte imbalances.
- Arrhythmias may be present due to extreme weight loss.
Treatment

• **Hospitalization**: wt loss of 25-30%, fluid or electrolyte imbalance
• **Management & stabilization** of abnormal serum electrolytes.
• **Weight management**: gradual weight gain of 0.1-0.2 kg/day.
• **Enteral feeding of total parenteral nutrition** (TPN).
• **Involvement of family in care**.
• **Counseling for long term care**.
**Bulimia Nervosa**

- A disorder characterized by over eating (a compulsion to consume large amounts of food in a short period of time).

- It followed by self-induced vomiting, large doses of laxatives or diuretics.

- Caused by sensitivity to social pressure for thinness, body image difficulties,
Clinical manifestations

• It is a silent disorder, physical finding depend on the degree of purging, starvation, dehydration & electrolytes imbalance.

• Most common findings are: dental caries, gum recession due to vomiting of gastric acids, abdominal distention.
Treatment

- Management of physiological problems, cognitive behavior therapy.
- Group therapy.
- Education about good nutrition.
- It does not require hospitalization unless serious symptoms or complication occur.