Pedo sheet#6

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**Early Childhood Caries**

* **Cariogenic microorganisms:**

Children who had acquired staphylococus mutans (MS) before 2 years of age showed greater caries experience in both primary and permanent dentitions compared to children who were colonized at later stage.

Data from clinical studies showed that children whose mothers have high concentration of salivary MS acquire the bacteria at **younger age** and **higher numbers** compared to children of mothers who have low MS levels.

Prevention of caries in children might be possible by reducing maternal MS counts and delaying colonization in the children. Suppression of maternal reservoir of MS by dental rehabilitation and antimicrobial treatment can delay or prevent infant inoculation.

* **Cariogenic diet:**

*Fermentable carbohydrates*

--> Sucrose, glucose, fructose, cooked starch

The small size of sugar molecules allows salivary amylase to split the molecules into components that can be easily metabolized by plaque bacteria.

Between-meal snacking and the frequency of eating and drinking fermentable carbohydrates are related to dental caries incidence.

Dental caries can be actively increased by consumption of sugar if it was in a form easily retained on the tooth surface. E.g. Sticky, sugary food.

The more **frequently** this form of sugar was consumed between meals, the **greater the tendency** for an increase in dental caries.

Fermentable carbohydrates + oral bacteria within plaque --> acid within plaque

Acid + susceptible tooth--> tooth decay

In young children, a cariogenic diet can be in the form of sweetened liquids in nursing bottles or sippy cups. This can have an enormous cariogenic potential. The extent and repetitive use of no-spill training cup or sipping from a bottle during the day are associated with ECC.

The use of a bottle containing milk, juice or any other sweetened liquid with fermentable carbohydrates as pacifier, **especially at night** has been associated with ECC.

***Infant feeding :***

Infants up to the age of one year are fed either through *breastfeeding* or *bottle feeding with infant formula*.

\*\*Milk:

Animal studies showed that cow's milk **doesn't produce caries**. *Its use however is* ***not recommended*** *before the first year of life.*

Babies cannot digest cow's milk as completely or easily as breast milk or formula. Cow's milk contains high concentrations of protein and minerals, which can overwhelm the baby's immature kidney.

\*\*Infant formulas:

Infant formulas are used for feeding of infants who are not breastfed.

Infant formulas for infant feeding, even without sucrose in their formulation**, are cariogenic.**

\*\*Breastfeeding:

The breastfeeding of infants provides general health, nutritional, developmental, psychological, social, economic, and environmental advantages while significantly decreasing the risk for a large number of acute and chronic diseases.

* **Breastfeeding and ECC:**

There have been concerns however about the association of breastfeeding and ECC.

Research shows that breastfeeding has not been **epidemiologically** associated with caries in the absence of other factors such as poor oral hygiene or a carbohydrate diet.

Studies involving primitive cultures, in which the rule was to breastfeed on demand including at night up to 18-36 months, show an extremely low prevalence of caries among children.

The benefits of breastfeeding until age two is recommended by WHO/UNICEF guidelines. Further prospective observational cohort studies are needed to strengthen the evidence.

Therefore, exclusive breastfeeding should be encouraged up to 6th month of life, maintained at least up to the 2nd year of life, with flexibility of schedules or shifts, and complemented with appropriate weaning food.

\*\*Cariogenicity of human milk:

Human milk, compared to cow's milk, has a low mineral content and higher concentration of lactose (7% vs 3%)

*Human milk is slightly more cariogenic than cow's milk.*

The evidence suggests that cow's milk and human milk are *less cariogenic than sucrose*, with cow's milk being the least cariogenic.

The cariogenic potential of *infant formulas* varied across the studies, with some being *as cariogenic as sucrose.*

Human milk and cow's milk can reduce dental plaque pH values, but to a lesser extent than sucrose.

The cariogenic potential of milk under normal conditions does not have clinical relevance.

Nutrient content, buffering capacity and other defense mechanisms found in breast milk may interfere with the existing microflora.

* **Bottle feeding and ECC:**

During bottle feeding, formula collects on the upper anterior teeth. This is especially harmful to the teeth during night, when saliva production is reduced.

Bottle feeding at night will lead to prolonged and frequent contact of teeth with cariogenic substance, which might predispose the child to caries progression.

On the other hand, breast milk is expressed directly into the soft palate and does not stagnate on the teeth.

Do bottle fed children have more dental caries in the primary teeth than breastfed children?

A recent systematic review was carried out.

* **Associated factors for ECC:**
* saliva:

Considerable importance has been placed on the salivary pH; the acid-neutralizing power; and the calcium, fluoride, and phosphorus contents of saliva.

A reduction in the salivary flow may predispose the child to caries.

The viscosity of saliva is related to the rate of dental decay.

* socioeconomic status:

- ECC is more commonly found in children who live in poverty or in poor economic conditions, and whose parents have low educational level, especially those with illiterate mothers.

- Malnutrition or undernourishment may cause enamel hypoplasia. Teeth become more prone to caries as a result.

- Poor oral hygiene with low exposure to fluoride

- Poor diet with a greater preference for sugary food.

- Emotional stress.

* **Pattern of ECC:**

Carious involvement of the maxillary anterior teeth, the maxillary and mandibular first primary molars, and sometimes the mandibular canines.

The mandibular incisors are usually unaffected except in severe cases.The lower anteriors are protected by the tongue and saliva pools around them.

* **Presentation:**

Starts with harmless looking white opaque spots on labial surface of the upper incisors. Little noticed by parents or physicians.

Progression of the disease yields brown spots, then cavitations. Carious lesions may be found on either the labial or lingual surfaces of the teeth and, in some cases, on both.

Chipping away of teeth and sometimes actual fracture of the tooth at the gum line. This exposure of the pulp tissue, allowing it to become necrotic which might lead to spreading infections.

* **Consequences of ECC:**

*Oral health means more than just health teeth*

* Oral health affects people physically and psychologically, and influences how they grow, look, speak, chew, taste food, and socialize, as well as their feelings of social well-being.
* Children's quality of life can seriously be affected by severe caries because of pain and discomfort.
* In most small children, ECC is associated with reduced growth and reduced weight gain due to insufficient food consumption to meet the metabolic and growth needs of children less than 2 years old.
* Pain
* Poor appetite
* Disturbed sleep
* Infections, e.g. abscess, cellulitis
* Emergency visits and possible hospitalizations
* Loss of school days with restricted activities
* Reduced ability to learn and concentrate
* Need for extractions in a young child which would require treatment under GA
* Premature loss of primary molars leading to malocclusion
* Poor oral health and dental disease often continue into adulthood
* Higher risk of new carious lesions in other primary teeth and the succeeding permanent dentition

*Dental home****:***

By establishing a dental home and taking preventive steps recommended by the dentists, parents can avoid their children contracting ECC.

* **Treatment:**

*Immediate intervention is necessary to prevent further dental destruction, as well as more widespread health problems.*

1- fluoride varnish

The reversal of the caries process depends on an intact surface layer of the lesion. Remineralization of incipient subsurface lesions may occur as long as the surface layer of the enamel remains intact. The use of the dental explorer to routinely probe enamel is no longer recommended.

Areas of decalcification and hypoplasia can rapidly develop cavitations. Application of fluoride varnish is recommended.

Biannual applications of fluoride varnish (5%NaF '22500ppm F', Duraphat) has resulted in a statistically significant reduction in caries incidence in young children.

***Fluoride varnish should be applied at least twice yearly in all children.***

2- initial treatment of all caries lesions to stop ar at least slow the progression of the disease.

**Interim Therapeutic Restorations (ITR) techniques**, using materials such as glass ionomer. Glass ionomers release fluoride, so they act as both preventive and therapeutic approaches.

3- in advanced cases, aggressive therapy is needed, usually under GA. This involves the placement of stainless steel crowns and extractions.

Children who have received dental treatment under GA were still highly predisposed to greater caries incidence in later years.

Low levels of compliance with follow-up care for ECC patients.

Prevention should be a priority.