**SHEET 3**

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\*Dear doctors :

Just to let you know after listening to the record of this lecture we noticed that the dr did not change anything from last year sheet , so we only did few edition ☺

Today were going to talk about :

* Effect / role of diet on dental caries before the eruption of teeth ( pre - eruptive stage )
* Effect/ role of diet on dental caries after the eruption of teeth ( post- eruptive stage )

***Pre-Operative effects of diet***

Question: Can nutrition during tooth development influence future caries risk ?

Answer: YES nutrition has an affect during tooth development ( Primary teeth = in utero , permanent teeth = from birth-10 years )

\*\*Diet effect pre-eruptive on teeth is small compared to Diet effect post-eruptive

\*\*Nutritional influences are excreted mainly during tooth formation .

Malnutrition and dental caries " have some effects such as:

 1. Enamel Hypoplasia 2. Salivary gland atrophy

Vitamin D deficiency : Studies say that :

1. Vitamin D deficiency in animals ( mainly dogs ) shows delayed development of teeth and deficient poorly calcified enamel
2. Vitamin D deficiency in children's teeth shows enamel hypoplasia ( that increases dental caries susceptibility ) and V.D supplementation will reduce the incidence of dental caries in children
3. In Canada, in order to increase the synthesis of V.D and decrease the incidence of caries ,they start use UV light in their schools

|  |
| --- |
| Vitamin D deficiency --- Hypocalcemia ----Hypoplasia -----dental caries  |

Other causes of enamel hypoplasia ( Proper history taken should be in cases of enamel defect )

* Systemic factors :
1. Nutritional deficiency
2. Genetic ( AI )
3. Neonatal disturbances
4. Infection diseases - rubella
5. Endocrinopathies -DM
* Local causes : ( Only one tooth is affected )
1. Trauma ( trauma to primary tooth might lead to hypoplasia in permanent tooth )
2. Radiation
3. Local infection ( turner tooth )

***Post-eruptive effects of diet :***

* ***Sugar and dental caries*** :

**Question: Do dental caries pattern change following changes in availability of dietary sugars ??**

**Answer: YES**

 1- War diets : During wars , the availability of sugar's diet was less and consequently the dental caries were less observed , but after wars the sugar's diet availability returned the same and an increasing incidence of dental caries was observed

 2-Alaska : Their diet is usually free of sugar so dental caries incidence is low

 3-Tristan da cunha : islands in the south Atlantic ocean ...Also have diet free of sugar so NO caries

**Question: Do people who consume high sugar diet have higher levels of dental caries ?**

**Answer: YES**

 1-Workers in confectionary sweet factories subjected to high incidence of dental caries

 2-Sugar-containing medication ( especially in children ) increase the incidence of dental caries (so always try to prescribe sugar free alternative )

**Question: Do people who consume low sugar diet have low levels of dental caries ??**

**Answer: Yes**

Sugar is needed to cause caries since bacteria undergo sugar fermentation to release acids that cause caries.

 Hereditary fructose intolerance ( people who lacks the enzyme that needed to metabolize the sugar ) shows low incidence of caries

 Hopewood house ( Children house in Australia ) : their main diet is Lacto-vegetarian diet ( Free-sugar diet) and their oral hygiene is virtually absent ( no brushing at all ) but their dental caries incidence is low ( when these children left the house and get back to the normal diet , their caries risk become equal to the rest of population )

**Question: Are all sugary foods the same ?**

**Answer: No**

Many studies were done to know the effects of consuming sugary foods of varying stickiness on caries development

One of these studies were made in Adult mental institution in Sweden ( 1945-1953) which is considered to be one of the unethical study ( because it is causing a disease , so any study now should have an ethical approval to make sure that this study is not going to harm the participants )

 Vipeholm study : they look for different consistencies of sugars :

 1. Refined sugars with slight tendency to be retained in the mouth ( slight consistency = chocolate ) at meal time ( only ) + in between meals

2. Refined sugars with strong tendency to be retained in the mouth ( strong consistency = toffee ) at meal time ( only) + in between meals

 \* and the conclusion was= The group receiving chocolate developed relatively fewer carious lesions than other groups receiving similar amounts of sugar( in grams ) at similar frequencies of different stickiness

**Question: Does the frequency and time of intake affect caries level ??**

Answer: YES

 \_ Consumption of sugars in between meals was associated with a marked increase in dental caries

 \_ Sugars intake even when consumed in large amounts had little effects on caries IF it was ingested up to a maximum of 4 times a day ( increments )

So when sugar intake was 4 times or more " there will be high risk of caries "

 \_ The increase in dental caries activity disappears on withdrawal of sugar- rich food

**Question: Are dental caries related to frequency of sugar intake or the amount consumed ??**

 \_ Frequency and amount are related to each other

 \_ Both frequency and amount are related to dental caries

 \_ At individual level easier to advice patient to reduce frequency of intake .

* But in general the frequency have a bigger role in developing dental caries

**Question: Are some sugars more cariogenic than others ??**

 Classical experiment on animals shows that sucrose is the highest cariogenic among other sugars( superinfected with S.mutans which utilizes sucrose in preference to other sugars)

 \_ Studies in human :

 1. They split people up to groups and give each group a diet exclusive with one type of sugar without giving them any other type of sugar ( sucrose only , fructose only and xylitol only ) \*Conclusion : NO difference in caries development between subjects to have diets sweetened with sucrose compared with fructose

 2. Physical location of sugars in foods and how it affects their cariogenicity.....Conclusion : No evidence that sugars located within the cellular structure of foods harmful to teeth and according to the physical location of sugars, UK committee on medical aspects of food policy ( COMA) classified sugars for dental health purposes into ( intrinsic and extrinsic ) according to location of the sugars .

 Intrinsic: inside the cellular structure of fruits , vegetables and cereals = NOT cariogenic

 Extrinsic: physically located outside the cellular structure of food . 1. Milk extrinsic sugars : sugars naturally present in milk and milk products ( like cheese and they are not cariogenic

2. Non-milk extrinsic sugars : added in fruits , juices , honey , and syrups .must be avoided

* **Fruits and dental caries**

**Question: does fruit cause caries ??**

 **-** According to human studies : No relation between fruit consumption and dental caries but only one study has shows that large quantities of grapes and apples have been associated with an increase in DMFT

 -Giving apples after meal did not increase caries risk

 \_ According to animals studies :

* Rats that fed on figs, apples , bananas , grapes, raisins .. higher caries risk than those fed on citrus fruits ,peanuts or dried apricots ( but it is not enough evidence to say that these fruits are cariogenic )
* Fresh fruits appear to be of low cariogenicity
* Citrus fruits have not been associated with development of caries ( but they are associated with erosion )
* Large amount of apples and grapes has been associated with high caries prevalence
* Consumption of dried fruit is low and not possible to give advice confidently on cariogenicity .
* Fruit juices and sugared flavored drinks are significant cause of dental caries
* UK department supports increasing consumption of whole fresh fruit in order to replace NMES( non-milk extrinsic sugar ) in the diet
* This is expected to decrease level of dental caries in the population
* ***Starches and dental caries***

**Question: does starch cause dental caries ??**

* No evidence starch is related to dental caries ( according to turkey study , wars , HFI : hereditary fructose intolerance )
* Starchy food is a negligible cause of dental caries
* Rice, potatoes and bread are of low cariogenicity
* BUT Addition of sugars increase cariogenicity .
* ***Novel carbohydrates***  : New carbohydrates that are added to the ingredient
* Glucose syrup : is added to infant food and drink , sport drinks , deserts , sweets , these glucose syrup considered as non milk extrinsic sugar so if eaten between meals should be cleared from the mouth quickly
* -Maltodextrins : considered as NMES
* Oligosaccharides : Medium chain glucose polymers , The undigested portion serves as food for friendly such as bifidobacteria and lactobacillus species ,.
* Isomaltooligosaccharides ( isomaltulose , palatinose and panose ) less acidogenic than sucrose or glucose
* Fructooligosaccharides : as cariogenic as sucrose … cariogenic
* ***Protective factors :***
* ***MILK :***
	+ - 1. Cow's milk =
* Lactose ( milk extrinsic sugar )
* Calcium and phosphorous ( which are important in remineralization of enamel )
* Casein ( phosphopeptide ) …its very useful in remineralization of enamel , and recently they have taken this casein component and put it in a certain paste ( his name ?? ) to be applied on teeth and help in their remineralization
* Rats fed milk as the sole sucrose – those fed milk solutions had fewer caries than those fed sucrose water solutions .
* Milk had anticariogenic properties
	+ - 1. Human's milk =
* Contain more lactose
* Has lower calcium and phosphorous
* Studies have shown that breastfeeding is associated with low level of dental caries …( problem is not in the breastfeeding itself but In how it's done….. → breastfeeding during night → milk all around the teeth with no saliva → increase dental caries incidence
	+ - 1. Infants formula =
* Contains similar amounts of lactose , Ca and PH to breast milk
* No benefit to dental health of feeding formula to infants
* Breast milk is advised as it provides the best nutrition
* **CHEESE :**
* Has many anticariogenic properties :

→ Stimulate salivary secretion : so decrease incidence of caries

→Increase plaque → increase Ca → increase remineralization

→Classical study shows that less caries develops ( over 2 years ) in children who ate 5g piece of hard cheese daily following breakfast compared with those who did not

* **CHOCOLATE :** ( Non sticky )
* Cocoa factor ( has a role in preventing dental caries )
* Theobromine ( increase enamel crystals size )
* Casein
* Ca
* Fats ( F.A that will coat the tooth and prevent dental caries )
* High sugar content

…. So what is the problem in chocolate ? … problem is the high sugar content in it

* ***SUMMERY :***

Good → Milk , Cheese , Starch , Fruits and vegetables

Bad → NMES ( Non-milk extrinsic sugar )

Ugly → sticky NMES ( as we said before chocolate is better than sticky food )