The RDs Role in Dental Health: How Traditional Diets Support Strong Teeth

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Today You Will Learn

• Bi-directional interrelationship between nutrition and oral health
• Association of traditional food patterns and food synergy to prevent oral infectious diseases
• Role of the RD in dental health care
Synergistic Relationship: Diet and Oral Health

• Inextricable link
  • Mouth is initial point of contact with nutrients
  • Salivary amylase aids in first step of digestion process
  • Maintaining natural teeth allows consumption of nutrient-dense diet
  • Poor oral health leads to compromised food choices
  • Poor nutrition increases risk of oral disease
Key Message

• Surgeon General’s report
  • Dietary choices affect oral health
Key Message

• **Academy of Nutrition and Dietetics**
  • “Nutrition is an integral component of oral health. The Academy supports the integration of oral health with nutrition services, education, and research. Collaboration between dietetics and dental professionals is recommended for oral health promotion and disease prevention and intervention.”
Key Message

- American Academy of Pediatric Dentistry (AAPD)
  - “Dental professional’s engagement in nutrition education and provision when necessary, of appropriate referral for dietary counseling from pediatrician or nutritional counseling.”
Hard Tissue of the Oral Cavity
Caries: Most Common Infectious Disease in Childhood

• Oral infectious disease of the teeth
• Primary teeth begin to erupt at 4-6 months of age
  • Susceptible to caries
• Caries incidence based on age:
  • 18% of children 2-5 years old
  • 45% of children 6-11 years old
  • 54% of adolescents 12-19 years old
Cariogenic Process is Influenced by Diet

- Salivary amylase, produced by salivary glands breaks down fermentable carbohydrates into oligosaccharides
- Substrates for cariogenic bacteria
- S. mutans and L. acidophilus
- Shift in composition of biofilm and a decrease in salivary pH
- Teeth become weak and demineralized
- Tooth decay and chronic infection
Impact of Severe Early Childhood Caries (ECC)

- Chronic dental pain
- Difficulty eating
- Malnutrition
- Premature tooth loss
- Economic burden
- Difficulty sleeping
  - A cross-sectional study of 500 child-parent pairs looked at ECC and quality of life (QOL) and found a significantly lower QOL in both child and parent

- School absence
Oral Home Care is Protective Against Caries

• AAP and AAPD recommend early dental visits
  • Child’s first dental visit should be within 6 months of eruption of first tooth or by age 12 months
  • Brushing and flossing
  • Topical fluoride
  • Regular check-ups
Healthy Diet is Protective Against Caries

• Genetics, hormones, medications, overall health
• Healthy dietary patterns
  • Form of food
  • Duration of exposure
  • Retention time
  • Nutrient composition and buffers
  • Fluoridated water
Fluoridated Water Recommendations

Establish a Healthy Beverage Pattern
An important part of establishing an overall healthy dietary pattern is careful consideration of beverages. Guidance for different beverage categories is provided below.

WATER
For healthy infants with adequate intake of human milk or infant formula, supplemental water is typically not needed in the first 6 months. Small amounts (up to 4 to 8 ounces per day) of plain, fluoridated drinking water can be given to infants with the introduction of complementary foods. Plain, fluoridated drinking water intake can slowly be increased after age 1 to meet hydration and fluoride needs.
DGA Major Recommendations

• Follow healthy dietary pattern
• Customize and enjoy nutrient-dense foods and beverages that reflect preference, culture and budget
• Meet nutrient needs with nutrient-dense foods
• Limit foods and beverages high in added sugars
HEI Scores in U.S.

Adherence of the U.S. Population to the Dietary Guidelines Across Life Stages, as Measured by Average Total Healthy Eating Index-2015 Scores

Figure 1-4

Maximum Total Score = 100

- Ages 2-4: 61
- Ages 5-8: 55
- Ages 9-13: 52
- Ages 14-18: 51
- Ages 19-30: 56
- Ages 31-59: 59
- Ages 60+: 63
Nutrient Dense Diet Reduces Caries Risk

- Recent cross-sectional study
- Data from the National Health and Nutritional Examination Survey (NHANES)
  - N = 7,751 adults
- Examined decayed, missing, filled teeth and untreated caries and looked at HEI scores

Results
  - Higher HEI scores associated with less untreated caries
  - Less sugar, more whole fruits and total fruits, greens and beans were associated with lower caries risk
  - “Integration of oral health promotion with nutrition education and guidance is crucial to ensure comprehensive care for patients of all ages.”
Severe Caries is Associated with Malnutrition

- Recent cross-sectional study published in the International Journal of Environmental Research and Public Health
  - Looked at diet, nutritional status and oral health
  - N = 273 Nepali children ages 6 months-12 years
  - Traditional diet in Nepal includes rice, lentils, vegetables (Dahl Bhat)
  - Traditional snacks: corn, popped corn, roasted soybeans; foods made from locally grown wheat and millet grains
Swapping Traditional Grains for Refined Carbs

• Children in Nepal are currently consuming “sweets, processed snacks, sugar-sweetened tea, other sugar sweetened beverages (SSBs) on a daily basis... a daily staple of the diet for many children”

• Increased intake of sugar consumption was associated with childhood malnutrition
  • Malnutrition defined by WHO criteria
  • 20% of the children had stunted growth, 14% underweight and 6% wasted

• Severe caries was associated with acute malnutrition in all ages and with chronic malnutrition in older children

• “The association between severe caries and malnutrition underscores the importance of caries prevention and early intervention” for optimal oral health, optimal nutritional status and optimal growth and development.
Intrinsic Natural Sugars

• Physically located in cellular structure and naturally present
  • Whole grains
  • Fruits and vegetables
  • Milk and dairy
Intrinsic Natural Sugars

- Do not contribute to caries
- May be protective against caries
  - Fiber
  - Fluid
  - Polyphenols
  - Mechanical stimulation of salivary flow
  - Calcium
Extrinsic Cariogenic Sugars in Our Diets

- Brown sugar, table sugar, corn syrup, beet sugar, maple syrup, turbinado sugar, coconut sugar, agave nectar, molasses, honey, date sugar...
Sugar Sweetened Beverages (SSB)

• Cross-sectional study published in Journal of the American Dietetic Association, found that increased SSB intake was associated with decreased calcium intake in young children

• Recent cross-sectional study in JADA looked at > 14,000 people, ages 2-74 “independent association b/w SSB consumption and caries...encompassing childhood to old age.”
Parents’ Ability to Identify Sugar in Beverages

• April, 2021 cross-sectional study of U.S. parents of children age 1-5, published in Pediatric Obesity

• Assess parents’ ability to identify sugar and non-nutritive sweeteners in beverages commonly consumed by children
  • Viewed both front and back of beverage labels
  • Incorrect identification of beverages with non-nutritive sweeteners
  • Misconceptions: unsweetened juice contained added sugar, sweetened flavored water did not contain sugar, and that 100% fruit juice contained < 100% juice

• Parents are not able to recognize added sugars and/or non-nutritive sweeteners in beverages
**Plethora of beverage choices**

- Waters
- Dairy milks, toddler milks and plant-based milks
- Caffeinated drinks
- SSBs
- Fruit juice and fruit blends
- Culturally-specific drinks
  - Yerba mate or Brazilian tea
  - Bubble tea, popular Taiwanese beverage
  - Sweet lassi, popular drink in India

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**Research shows that what children drink from birth through age five has a big impact on their health — both now and for years to come.**

While every child is different, the nation's leading health organizations agree that for most kids, the following recommendations can help to set children on a path for healthy growth and development. As always, consult with your health care provider about your child’s individual needs.

**ALL KIDS 5 AND UNDER**

- **Babies need only breast milk or infant formula to get enough fluids and proper nutrition.**

**0-6 MONTHS**

- Babies need only breast milk or infant formula to get enough fluids and proper nutrition.

**6-12 MONTHS**

- In addition to breast milk or infant formula, offer a small amount of drinking water once solid foods are introduced to help babies get familiar with the taste — just a few sips at meal times is all it takes. It’s best for children under 1 not to drink juice. Even 100% fruit juice offers no nutritional benefits over whole fruit.

**12-24 MONTHS**

- It’s time to add whole milk, which has many essential nutrients, along with plain drinking water for hydration. A small amount of juice is ok, but make sure it’s 100% fruit juice to avoid added sugar. Better yet, serve small pieces of real fruit, which are even healthier.

**2-5 YEARS**

- Milk and water are the go-to beverages. Look for milks with less fat than whole milk, like skim (non-fat) or low-fat (1%). If you choose to serve 100% fruit juice, stick to a small amount, and remember adding water can make a little go a long way.
Caregiver’s Knowledge About Caries

• Cross-sectional study published in Pediatric Dentistry Journal assessed knowledge regarding sugar, simple carbohydrates and dental caries
• N = 55 caregivers of pediatric dental patients
• Results:
  • Poor understanding:
    • Caries etiology
    • Role of fermentable carbohydrates in pit and fissure caries development
    • Caries prevention
  • Good understanding:
    • Sugar is cariogenic, an “empty calorie food”
    • Child should avoid SSBs, candy and sweets
Research: Maternal Obesity and Child’s Caries Risk

• Wigen et al conducted a study based on data from the Norwegian Mother and Child Cohort Study
• “Children with an obese mother or one whose diet was rich in sugar and fat early in pregnancy” were at higher risk of developing caries at age 5
  • Child with obese mother had a 2.3 times higher risk of caries development
  • When mom consumed more sugar or fat than recommended, child had 1.5 and 1.6 times higher risk
  • Other factors that increased caries risk included non-western origin and low education
Promote a Healthy Dentition

- Promote healthy eating patterns, behaviors and habits
  - Frequency of food and beverages should be at least 2 hours apart
    - Discourage frequent snacking
    - Discourage cariogenic foods and SSBs
- Families can select nutrient-dense, cariostatic foods
Shift to Whole Grains

• Nutrient-dense
• Contain fiber, vitamins, polyphenols, minerals, antioxidants, positively affect gut and oral microbiota
• Whole grains are associated with reduced caries risk
Soft Tissue of Oral Cavity
Gum Disease

• Gingivitis
  • Inflammation of the soft tissue component of the periodontium
  • Initial condition that predisposes patient to periodontal disease

• Good oral hygiene, regular dental visits and a diverse nutrient-dense diet can reduce the severity of the gingivitis
  • Adequate calcium, vitamins D, K, magnesium, phosphorus are needed to support optimal alveolar bone density
  • Adequate calories, protein, vitamins C, A, E, omega-3 fatty acids, Fe, Zn, antioxidants are needed for healthy oral soft tissue
Periodontal Disease

• Affects 50% of adults in U.S.
• Chronic inflammatory disease that leads to systemic inflammation and tooth loss, if untreated
  • Caused by bacteria and lipopolysaccharides
  • Resulting in osteoclastic activity and alveolar bone loss
• Linked to:
  • High blood pressure
  • Cardiovascular disease
  • Diabetes
  • Adverse pregnancy outcomes, such as preterm delivery
  • Severity of COVID-19 infections
    • Recent case-control study published in Journal of Clinical Periodontology, n= 568 patients found that periodontitis was associated with COVID-19 complications and death
Omega-3 Fatty Acids

- α-Linolenic acid (ALA), Eicosapentaenoic acid (EPA), Docosahexaenoic acid (DHA)
  - Lower risk of chronic disease, including cardiovascular disease
  - Protective against periodontitis
    - Anti-inflammatory and antibacterial effect on common oral pathogens
  - Inverse relationship between high dietary intake of DHA and periodontitis
    - Nationally representative cross-sectional study published in the Journal of the American Dietetic Association, n = >9,000 adults from NHANES
    - Authors suggest that 2 servings of fatty fish q week may help decrease risk for periodontitis
Tooth Loss and Dentures

• Partial or full removable dentures impact ability to bite, chew and swallow
• Ability to chew with dentures is only 20-25% that of natural teeth, due to reduced bite force

• Nutrition intervention
  • Cut foods into small sizes
  • Offer mechanical soft diet
  • Moisten hard to chew food

• Dental intervention
  • Dental implants may help to restore mastication and lead to intake of more nutrient-dense foods
How What we Eat Impacts our Oral Health
# Nutrient Deficiencies Affect Oral Health

<table>
<thead>
<tr>
<th>Deficiency</th>
<th>Oral developmental disease</th>
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<tbody>
<tr>
<td>Protein</td>
<td>Delayed tooth eruption</td>
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<td></td>
<td>Decreased enamel solubility</td>
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<tr>
<td>Vitamin A</td>
<td>Impaired epithelial tissue development</td>
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<td></td>
<td>Impaired tooth formation</td>
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<td></td>
<td>Enamel hypoplasia</td>
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<tr>
<td>Vitamin D and Calcium</td>
<td>Hypomineralization</td>
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<tr>
<td></td>
<td>Delayed tooth eruption</td>
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<td></td>
<td>Abnormal alveolar bone</td>
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<tr>
<td>Vitamin C</td>
<td>Delayed wound healing</td>
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<td></td>
<td>Dentin malformation</td>
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<tr>
<td></td>
<td>Defective collagen formation</td>
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</tbody>
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Food Synergy

• “In recent years researchers, public health experts and RDs have acknowledged that nutrients and foods are not consumed in isolation. Rather, people consume them in various combinations over time—a dietary pattern—and these foods and beverages act synergistically to affect health.” DGA
Healthy Plant-based Diet Associated with Lower Risk CVD

• A recent study published in the Journal of the American Heart Association
  • Community-based cohort of 12,168 middle-aged adults in Atherosclerosis Risk in Communities Study
• Median follow-up 25 years
• Used established plant-based diet scores to assess dietary intakes
• Results: healthy plant-based diet group (whole grains, fruits, vegetables, nuts, legumes, tea, coffee) had a 19% lower risk of cardiovascular disease (CVD)
  • “...potential synergistic and interactive effects of foods and nutrients on disease risk.”
Plant-based Diet may Reduce Gingivitis

• A recent German study
  • Randomized controlled trial
  • N = 32 adults
  • Half ate plant-based whole foods for 4 weeks (low in processed food, high in plants) and half no change to current eating habits
  • Results showed significant reduction in gingival bleeding in plant-based whole foods group
  • “Dental teams should address dietary habits and give adequate recommendations in the treatment of gingivitis, since it might be a side effect of a pre-inflammatory Western diet.”
Traditional Dietary Patterns

• “Combination of foods and beverages that constitute an individual’s complete dietary intake over time” DGA

• Cultural beliefs, lifestyles, physical activity and healthy eating patterns work together to optimize overall health
Time to Spice up your Life!

• Including herbs and spices in diet is a healthy way to help cut out sodium and flavor dishes that are unique to specific cultures

• Culinary herbs and spices used in Thai cuisine may benefit oral health

• All essential oils reduced S. mutans biofilm
  • In vitro study performed at Mahidol University in Thailand
  • Extracted essential oils from sweet basil, cinnamon bark, sweet fennel, kafir lime, black pepper, peppermint, spearmint showed anti-plaque and anti-cariogenic properties
Sialogogues

- Fennel
- Cardamom
- Ginger
- Cayenne pepper
Dark Chocolate

- In vitro study published in the European Journal of Oral Sciences, found that using extracted cocoa polyphenols from cocoa beans resulted in bacteriostatic inhibition of S. mutans, S. Sanguinis, biofilm formation and inhibited acid production.
“Healthy Nutrition for Healthy Teeth”

• Academy of Nutrition and Dietetics (Feb 2, 2021)
  • Eat a variety of nutrient-dense foods
    • Calcium and phosphorus for strong teeth and bones
    • Vitamin C for gum health
  • Snack on raw fruits, vegetables, plain yogurt, popcorn
  • Do not put baby to bed with bottle
  • Limit juice, flavored milks and SSBs
RDs in Clinical Setting, Community and Research

• Include oral health screening in nutrition assessment
• Look for potential oral manifestations of systemic disease
• Work closely with dental team to assess oral-nutrition issues and treatment plans
• Evaluate potential impaired nutrient intake
• Collaborate with dental teams to provide comprehensive oral health and nutrition programs in community
• Integrate oral and nutrition initiatives into employee wellness programs
• Incorporate oral health into nutrition research
Thank you!

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Questions

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