Alternative to Systemic Water Fluoridation
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The communal water fluoridation is a successful method for the prevention of dental caries. In presence of objection against this method or there is no piped water supply as in rural area, there are alternative methods to provide systemically. These are alternatives as:

1- School water fluoridation (or home water fluoridation).
2- Dietary fluoride supplements by:
   A- Fluoridated tablets (drops or lozenges).
   B- Fluoridated salt.
   C- Fluoridated milk (or juice).

School Water fluoridation:
This method was first applied in USA, 1954, in which the F content of the water supply was adjusted for the prevention of dental caries. The optimal level of F here is about 4.5 times the optimal amount in the community. This is because:
- Children spend only a part of their total waking hours in schools.
- They enter the school at 6- year of age, thus the incisors are no longer at risk of dental fluorosis.
- Only a part of daily water intake is consumed.

For all of the above and to compensate for the part exposure to F, the level of fluoride in school water supply increased. Special equipment can be used for the addition of F, which should be adjusted continuously by well trained employee.

Advantages of school water fluoridation:
- Technically feasible.
- Low in cost.
- No effort is needed by the recipients.

Fluoridated supplements:

1- Tablets, drops and / or lozenges:
This is especially prescribed for children with high risk to dental caries, handicapped children, or those with serious illness as blood disorder. This method is an effective measure to prevent or reduce dental caries provided to taken daily from birth, or the first years of life till 13-15 years, caries reduction can reach 50-80%. A variety of supplements are present in form of NaF.
- Liquid form for infants and young children, concentrations are 0.125 mg F/ drop, 0.25 mg F/ drop, and 0.5 mg F/ drop.
- Liquid form with vitamins as A, D, C, E, E, B1, B3, B6, B12 and Iron, prescribed to mal nourished children only.
- Tablets with or with out vitamins, it can chewed the swallowed.
- For school children more than 6 years of age a mouth wash fluoride of 5 ml can be used. The child is asked to rinse his mouth first for one minute then swallow to have a topical and systemic effect.
Note: Supplements should be given daily, Not with milk

In prescription of F tablets several important factors should be taken in consideration.
- F content of the water supply, (communal or bottled water). Applied only in non F area or those with low F leve.
- Age of the child.
- Co operation of parents.

Fluoridated tablets (drops ).
NaF, 2.2mg (1 mg F).

<table>
<thead>
<tr>
<th>Age</th>
<th>Conc.</th>
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<tr>
<td>0-2 yr.</td>
<td>0.25 mg</td>
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<tr>
<td>2-4 yr.</td>
<td>0.5 mg</td>
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<tr>
<td>4- yr.</td>
<td>1.0 mg</td>
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Drops: 10 drops = 1 mg F/ L = 1ppm

Another Program:
- Started at 3 years of age give 0.5 mg/day till 13 – 15 years.
- In presence of dental caries (0.25 mg/day till 3 years) then 0.5 mg/ day till 13-15 years.

Instructions:
1- Given daily (once or twice).
2- Tablets crushed between teeth.
3- Each bottle contains not more than 264 tablets, to avoid acute toxicity after the accidental ingestion of fluoride tablets.
4- Dentifrices used should be with out F, or with a low concentration.

Fluoridated Salt:

It was introduced first in Switzerland, 1955. It is considered next to water fluoridation regarding caries reduction. F is added to salt in form of NaF or CaF₂ in different doses, 200, 250, 350 mg F/ kg of salt for domestic use or bakeries. Advantages of salt fluoridation are;
- low cost
- ease of implementation
- no personal efforts is needed.
- Effective in caries reduction for permanent as well deciduous teeth
Disadvantage; children would start to use salt too late in life, or they used to take small amount of salt.

**Fluoridated milk:**

Human and bovine milk contain a low level of F about, 0.03 ppm. Milk is a good food for infant and children, it is a suitable vehicle for supplementary F to children, it is an excellent source for calcium and phosphorous in addition to vitamin D. Milk is essential for development of bones and teeth.

The bioavailability of F from milk is in similarity to water, other studies showed that milk may retard the absorption of F from GIT, but does not prevent F absorption.

Fluoridated milk can be used in home and school programs, with caries reduction of 70%.

The disadvantages of milk fluoridation are the high cost. Some children dislike milk, for them a fluoridated juice can be used.

**Topical fluoride therapy:**

This term refers to the use of systems containing relatively large concentration of fluoride applied locally or topically to erupted tooth surfaces in order to prevent or arrest dental caries. The primary reactions product involved the transformation of surfaces hydroxyapatite to calcium fluoride.

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Ca_{10}(PO_4)_6 + 20F^- \rightarrow 10CaF_2 + 6HPO_4^- + 2(OH)^- 
\]

Calcium fluoride is a loosely bound fluoride, dissolved rapidly and there for to increase fixation of fluoride it needs to be applied frequently and continuously.

The use of topical fluoridation started in 1940, to control dental caries. The best time of application of topical agents is in the post eruptive maturation period that is the two years after eruption. Ionic exchanges continue between the oral environment and outer enamel surface.

Topical fluoride therapy involves:

1- **Self – applied fluoride.**

A relatively low concentration of fluoride applied by individuals themselves. The concentration of fluoride is about 1000 ppm. This system includes:

- Dentifrices
- Mouth rinses
- Fluoridated gel

Agents can be used once or twice a day used once or twice a day, and a combination of two types can be applied.

2- **Professionally applied fluoride.**

It is the periodic application of a high concentration of fluoride to the erupted teeth by dentists or dental hygienist every 3, 6, or 12 months. The concentrations of fluoride are 9000 – 19000 ppm, it may reach for some agents to 23000 ppm. Agents can be applied inform of solutions, gel, varnishes, prophylactic pastes or pumice.