Products available for topical fluoride therapy

J I Bischoff, E H M van der Merwe and D H Relief

Dental Research Unit of the University of the Witwatersrand and the South African Medical Research Council, Johannesburg

SUMMARY

In view of the absence of water fluoridation in South Africa, topical fluoride therapy plays an important part in preventive dentistry. Various topical fluoride agents available in this country, their mode of application, efficacy and possible advantages or disadvantages are discussed in terms of the current literature.

INTRODUCTION

One of the most safe, practical and economical means of combating dental caries is by the fluoridation of the public water supplies to an optimal level of 1 ppm of fluoride. The Food and Nutrition Board of the National Research Council in the United States of America has recently classified fluoride as an essential nutrient because of its critical role in the development of teeth which are resistant to dental caries (Horowitz, 1973). In 1972, 146 million people in 31 countries were supplied with optimally artificially fluoridated water (Newbrun, 1972). These populations are 50 per cent less likely to develop caries, even without renouncing sweets or changing their pattern of oral hygiene (Mühlmann, 1967). In the absence of water fluoridation in South Africa, however, other methods must be considered to obtain the cariostatic benefits of fluoride.

Fluoride may be administered in one of two ways, either systemically or topically. Topical fluoride therapy may be professionally- or self-administered. These methods and the fluoride products locally available are briefly reviewed in this paper.

SYSTEMIC ADMINISTRATION OF FLUORIDES

1. Fluoride-containing tablets

The administration of fluoride in tablet form permits an optimum daily intake of fluoride. This intake is especially valuable during the period of tooth formation, namely from birth to 12 years. Excellent clinical results have been reported and protection against dental caries may range from 20% to 50% depending on the duration of fluoride ingestion (Horowitz, 1973). Several brands of fluoride tablets are available (Table I).

In the case of infants, the tablets can be dissolved in water or juice, or crushed and mixed into food. Once the teeth have erupted, children should be persuaded to chew, and later to suck the tablets, thus achieving an additional topical effect. Appropriate dosages for different ages are prescribed by the manufacturers.

<table>
<thead>
<tr>
<th>Brand</th>
<th>mg fluoride as NaF/tablet</th>
</tr>
</thead>
<tbody>
<tr>
<td>En-De-Kay</td>
<td>1.0</td>
</tr>
<tr>
<td>Pacemaker</td>
<td>1.0</td>
</tr>
<tr>
<td>Zymofluor</td>
<td>0.25</td>
</tr>
</tbody>
</table>

* Commercial and Industrial Dental Company (Pty) Ltd.
1  P. Grant Smith

TOPICAL ADMINISTRATION OF FLUORIDES

A. Professionally administered

Once crown formation is complete and the permanent teeth have erupted, the enamel fluoride content may be increased by various methods of topical fluoride treatment. Although these procedures are benefi-
special to patients of all ages, increased benefit may be derived immediately after the eruption of the permanent teeth since at this time the enamel is particularly able to incorporate minerals from the oral environment (Massler, 1970).

1. Fluoride gels

The gels locally available are listed in Table II, together with the type of fluoride used and the concentration of total ionic fluoride. As a rule gels are flavoured and pleasant tasting, which may facilitate their use with young children.

Gels may be applied with an applicator such as a cotton pellet, or using any of the pre-formed trays available for this purpose. Trays may also be individually moulded using disposable wax mouthpieces. This promotes a close contact which may not be achieved from an ill-fitting pre-formed tray. Gel application may be modified using iontophoresis whereby the teeth are charged with a small positive electrical potential thereby attracting the negative fluoride ion from the gel. The manufacturers of Fluocaril and Ion products supply iontophoretic instruments and therapeutic gels are specifically suitable for iontophoresis.

2. Fluoride solutions

Solutions for topical application are also available (Table III). These are applied with cotton pellets or in trays lined with filter paper.

The same fluoride composition is used in many of the gels and solutions (Tables II and III). In mai

<table>
<thead>
<tr>
<th>TABLE II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLUORIDE GELS</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

1. P. Grant Smith (Pty) Ltd.
2. Dental Supply and Import Co. (Pty) Ltd.
3. Commercial and Industrial Dental Co. (Pty) Ltd.
4. Protea Surgical and Dental Services (Pty) Ltd.
5. Milner's Dental Suppliers Cape (Pty) Ltd.
6. Oramed (Pty) Ltd.
7. De-Nol Laboratories (S.A.) (Pty) Ltd.

<table>
<thead>
<tr>
<th>TABLE III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLUORIDE SOLUTIONS</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

1. P. Grant Smith (Pty) Ltd.
2. Dental Supply and Import Co. (Pty) Ltd.
3. Commercial and Industrial Dental Co. (Pty) Ltd.
4. Protea Surgical and Dental Services (Pty) Ltd.
5. Milner's Dental Suppliers Cape (Pty) Ltd.
6. Oramed (Pty) Ltd.
7. De-Nol Laboratories (S.A.) (Pty) Ltd.
Fluoride ion

Amine fluoride

MFP

Fluoride compound

Promising results have been obtained using this paste in mass treatment of children in a caries prevention programme during which the paste was self-applied (Mühlemann, 1968; Lang et al., 1970). Stearns (1973), using a NaF-containing prophylaxis paste, found that the fluoride concentration was maintained in the teeth after prophylaxis. Whitehurst et al. (1967), comparing a SnF$_2$-containing paste with one containing NaF, found the former to be more effective in reducing enamel solubility. The NaF in this case was, however, in a much lower concentration than that in the Pacemaker paste.

B. Self administered

Considering the shortage of manpower in the dental profession and the high cost of topically applied fluoride treatment, self-applied agents offer a promising supplement to a caries prevention programme.

1. Fluoridated toothpastes

The use of fluoridated toothpastes is a practical and inexpensive extension in such a programme. Various formulations of fluoride dentifrices have been shown to reduce dental caries in the range of 15 to 30 per cent (Marthaler, 1968; Horowitz, 1973). Several brands of therapeutic fluoride dentifrices are available on the market (Table IV).

**TABLE IV**

<table>
<thead>
<tr>
<th>Brand</th>
<th>% Fluoride ion</th>
<th>Fluoride compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoro-Gard</td>
<td>0.1</td>
<td>MFP</td>
</tr>
<tr>
<td>Signal</td>
<td>0.1</td>
<td>MFP</td>
</tr>
<tr>
<td>For Keeps</td>
<td>0.1</td>
<td>MFP</td>
</tr>
<tr>
<td>Aquafresh</td>
<td>0.1</td>
<td>MFP</td>
</tr>
<tr>
<td>Macleans</td>
<td>0.1</td>
<td>MFP</td>
</tr>
<tr>
<td>Flucard</td>
<td>0.1</td>
<td>MFP, NaF</td>
</tr>
<tr>
<td>Emax</td>
<td>0.125</td>
<td>Amine fluoride</td>
</tr>
</tbody>
</table>

Caulk Ziracete treatment paste containing 9 per cent SnF$_2$ and Pacemaker$^1$ prophylaxis paste containing 4.4 per cent NaF are available. Whitehurst et al. (1967), have shown that Ziracete paste reduces enamel solubility. Promising results have been obtained

3Fluoride and sodium monofluorophosphate (MFP) have both been found effective in reducing caries (Fanning et al., 1967; Naylor and Emslie, 1967; Mergele, 1968; Müller, Holst and Sörensen, 1968; Thomas and Jamison, 1968). Sodium monofluorophosphate is today generally favoured above SnF$_2$ which was again reported to cause staining of tooth enamel (Naylor and Emslie, 1967). Sodium fluoride is less frequently used in toothpastes but has also been shown to be effective (Reed, 1973). In Switzerland the amine fluoride-containing dentifrices have given dramatic results in reducing dental caries (Mühlemann and Schmid, 1958; Mühlemann, 1967; Marthaler, 1968).
The low concentration of fluoride ion in toothpastes make them safe for children to use. It should be kept in mind that greater effectiveness of a therapeutic dentifrice may be achieved when frequent use is accompanied by careful and thorough brushing.

2. Mouthwashes

Regular rinsing with a fluoride-containing mouthwash has been shown to be beneficial in reducing tooth decay (Torell and Ericsson, 1965; Horowitz, Creighton and McClendon, 1971; Aasenden, DePaola and Brudevold, 1972; Heietz, Driscoll and Creighton, 1973; Rugg-Gunn, Holloway and Davies, 1975). Depending on experimental conditions, caries reductions between 25 and 50 per cent have been reported (Horowitz et al., 1971; Aasenden et al., 1972; Rugg-Gunn et al., 1973).

Torell and Ericsson (1965) found the daily use of a 0.05 per cent neutral NaF solution to be more effective than one fortnightly rinse with a 0.2 per cent NaF solution. In general weaker solutions are recommended for more frequent use. As with toothbrushing, regular and continuous use is essential to maintain effectiveness (Koch, 1969). A fluoride mouthrinse manufactured by Pacemaker is available locally and contains 0.2 per cent neutral NaF.

3. Gels

A busy dentist may consider recommending the use of self-applied gels to responsible patients. A kit for self-application is available (Thera-Flur kit) and contains full instructions for use, two pre-formed trays and 24 ml API gel which has a fluoride ion concentration of 0.5 per cent. This is similar to the kit recommended for use by the U.S. Peace Corps (Law, 1966).

CONCLUSION

The authors do not claim that the products mentioned above are the only ones available for topical fluoride therapy in the Republic of South Africa. These were the products supplied in response to a request which was made to all suppliers known to us. The products have been objectively discussed in terms of the current literature and no preference for any one product is intended. Certain fluoride-containing restorative materials and cements are available, but these fall outside the scope of this article. We wish to thank the following dental suppliers for their contribution of literature, information and samples.

These firms are listed alphabetically.

Colgate-Palmolive Ltd.

Commercial and Industrial Dental Company (Pty) Ltd.

De-Nol Laboratories (S.A.) (Pty) Ltd.

Dental Supply and Import Co. (Pty) Ltd.

Elda-Gibbs (Pty) Ltd.

P. Grant Smith (Pty) Ltd.

Millner's Dental Suppliers Cape (Pty) Ltd.

Oramed (Pty) Ltd.

Protea Surgical and Dental Services (Pty) Ltd.

REFERENCES


TOPICAL FLUORIDE THERAPY


