



## Patterns of Fluoride Mouthrinse and Gel Use by Children 6 to 96 Months of Age

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### Abstract

**Purpose:** The purpose of this paper was to report longitudinally on parental reports of mouthrinse/gel use at home and at preschool/elementary school until age 8.

**Methods:** A cohort recruited at birth was followed in the Iowa Fluoride Study (IFS). Demographic data were collected at baseline. Pretested questionnaires were sent to participants at 3- to 6-month intervals, from ages 6 to 96 months, concerning many aspects of fluoride exposures and intake—including home use of fluoride mouthrinse/gel and participation in fluoride mouthrinse programs at preschool/elementary school. Summary statistics were computed for each period. Associations between home fluoride mouthrinse/gel use and demographic covariates were assessed.

**Results:** There were 1,388 participants. However, the number of respondents for each study interval varied from 549 to 800. Most participants were white, with about two thirds of parents having some college education. The percentage with use at home/preschool/elementary school during the period increased from less than 1% for 12 months to 3% at 48 months, 11% at 72 months, and 25% at 96 months. Fluoride mouthrinse use at preschool/elementary school was consistently less common than mouthrinse use at home. There were no significant associations between fluoride mouthrinse/gel use and demographic covariates. Patterns of fluoride mouthrinse use among users (N=205) indicated that, when children became older, higher proportions used fluoride mouthrinse and used them more consistently over time.

**Conclusions:** A relatively small percentage of children used fluoride mouthrinse/gel, and this proportion increased with age. (Pediatr Dent 2005;27:217-220)

**KEYWORDS:** PATTERNS, TOPICAL, FLUORIDE, MOUTHRINSE, CHILDREN

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In the United States, as in many other industrialized countries, there has been a significant overall decline in the prevalence of dental caries in children.<sup>1-6</sup> The main factor involved in this decline has been the widespread use of fluoride in various forms—in drinking water, foods and beverages, dietary fluoride supplements, dentifrices, mouthrinses, professional topical applications, and a variety of other fluoride-containing restorative products.<sup>4</sup> The decline in the prevalence of dental caries, however, was not uniform for all children.

Most of the decay is present in a small, highly susceptible proportion of children.<sup>7,8</sup>

Marinho et al<sup>9</sup> also reviewed the available evidence from clinical trials on the effectiveness of fluoride mouthrinse in preventing dental caries. They found mean caries reductions, in DMFT and DMFS, of 28% and 30%, respectively. Most of these studies of the effectiveness of fluoride mouthrinse in reduction of dental caries in schoolchildren were from the 1970's and early 1980's.<sup>10-13</sup> The current benefit of mouthrinse in combination with other fluoride-containing products (dentifrices, tablets, varnishes, or gels) is, however, less clear.<sup>14-17</sup> Hence, the effectiveness of fluoride mouthrinse as a population-based strategy is in doubt.<sup>14,18-21</sup> The current view holds that fluoride mouthrinse is recommended primarily for individuals or groups at high risk for dental caries, while avoiding use in young (younger than 6 years) children who might swallow substantial amounts of fluoride.<sup>14,22,23</sup>

Data from the 1986<sup>24</sup> and 1989<sup>25</sup> US National Health Interview Surveys indicated that fluoride mouthrinses were used at home by 7% and 4% of children aged 2 to 4 years

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and 14% and 9% of children aged 5 to 8 years, respectively. Percentages in preschool/elementary school fluoride mouthrinse programs in the 1986 and 1989 surveys were approximately 2% for children aged 2 to 4 years and approximately 16% for children aged 5 to 8 years.<sup>24,25</sup> No studies have reported comprehensively and longitudinally on the use of fluoride mouthrinses at home/preschool/elementary school and use of gel at home by young children.

This report's purpose was to present data on parental reports of home and preschool/elementary school mouthrinse use and home use of gel among a cohort of children studied from birth until age 8.

## Methods

Newborns recruited from 8 hospitals in eastern Iowa, comprising about 20% of all new Iowa births,<sup>26</sup> were followed for 8 years as part of the Iowa Fluoride Study (IFS).<sup>26-28</sup> After approval from The University of Iowa Institutional Review Board, parents were asked to provide informed consent. At baseline (1992-1995), detailed information regarding ages of parents, water sources, and other family demographics was obtained through questionnaires and interviews with mothers.

Participants were then mailed pretested questionnaires to their homes at 3- to 6-month intervals when their children reached ages 6 to 96 months (22 total time periods). The nonrespondents received mailings again after 3 and 6 weeks, if necessary. Each questionnaire included questions concerning many aspects of fluoride exposures and intake,<sup>26,29,30</sup> including home use of fluoride mouthrinses and gel and participation in fluoride mouthrinse programs at preschool/elementary school by children during the specific time period.

Summary statistics (proportions) among those who responded to this questionnaire were determined for 8 selected time periods (12, 24, 36, 48, 60, 72, 84, and 96 months). Also, additional summary statistics were calculated among the 205 participants who had used mouthrinses or gel at home at least once during the 22 study time periods (6 to 96 months). Analyses of the associations between fluoride mouthrinse use at home or at preschool/elementary school and other demographic

covariates of interest were conducted using chi-square tests. Statistical procedures were conducted using the SPSS 9.0 program (SPSS Inc, Chicago, Ill).<sup>31</sup>

## Results

This study recruited a large number of participants (1,882), with 1,388 subjects having completed the baseline and 1 or more subsequent questionnaires. Respondents were of relatively high socioeconomic status (SES).<sup>26</sup>

The percentages with any use at home and/or preschool/elementary school increased substantially with age (Table 1), while fluoride mouthrinse use at preschool/elementary school was consistently less than mouthrinse and gel use at home. The percentages of home users of fluoride mouthrinse or gel increased from approximately less than 1% of subjects aged 12 and 24 months to 2% to 3% at ages 36 and 48 months, 6% to 9% at ages 60 and 72 months, and 13% to 15% at 84 and 96 months, respectively. About 97% of the home use of topical fluoride was via mouthrinse and 3% was in gel form (in addition to less than 1% using high-concentration fluoride dentifrices). Approximately 96% of the home-use fluoride was obtained from over-the-counter (OTC) products, and about 4% was prescribed.

Considering all responses from the 1,388 children who participated in this study, during the 22 time periods (from 6 to 96 months), 205 (15%) participants reported using fluoride mouthrinse or gel at home at least once. For ages 9 to 36 months, approximately 91% of respondents reported not using fluoride mouthrinse or gel at home, about 7% used them 25% or fewer of the time periods with responses, and 1.5% reported greater than 25%. For ages 40 to 72 months, about 48% of respondents reported not using fluoride mouthrinse or gel at home, 21% used them 25% or fewer of the time periods, 18% used them 25% to 50% of the time periods, and 13% used them 50% or more of the time periods. For ages 78 to 96 months, about 22% of respondents reported not using fluoride mouthrinses or gel at home, 21% of respondents used them 25% or fewer of the time periods, 21% used them 25% to 50% of the time periods, and 36% used them 50% or more of the time periods.

**Table 1. Percentages With Use of Fluoride Mouthrinse or Gel at Home and Fluoride Mouthrinse at Preschool/Elementary School for 8 Selected Time Periods**

Variable	Category	Time periods (age) in months							
		12 (N=800)	24 (N=657)	36 (N=632)	48 (N=613)	60 (N=640)	72 (N=613)	84 (N=517)	96 (N=549)
Any fluoride rinse/gel use*	Yes	0.3	0.2	1.7	3.4	6.3	11.3	21.9	24.6
Any preschool/elementary school mouthrinse	Yes	0	0	0	0.3	0.7	4.4	12.0	12.0
Any home fluoride rinse/gel use	Yes	0.3	0.2	1.7	3.3	5.8	8.5	13.0	14.9

\*Including fluoride mouthrinse or gel at home and/or fluoride mouthrinse at preschool/elementary school.

In this study, the authors explored the:

1. bivariate associations of the use of:
  - a. fluoride mouthrinse or gel at home; or
  - b. fluoride mouthrinse use at preschool/elementary school;
2. independent demographic variables of:
  - a. mothers' and fathers' ages;
  - b. mothers' and fathers' education levels;
  - c. family income;
  - d. race;
  - e. whether their child was first born.

No significant associations between the use of fluoride mouthrinse or gel at home or at preschool/elementary school and the demographic variables were found.

### Discussion

This study used a different approach than most other studies. Fluoride mouthrinse use was assessed longitudinally at multiple time periods, near the time of exposure, to reduce recall bias among parents.

The data were collected via parent self-reports without direct validation, since it was not feasible in terms of time, costs, and respondent burden to do detailed validation. Since few children had responses reported for all 22 time periods, there are variable numbers of measurements per individual. This study sample was predominantly white, with higher socioeconomic (SES) parents. It is not fully representative of any defined population group. Therefore, generalizing these results to broader population groups, particularly to those of lower SES or of a racial minority, should be done with caution.

The authors' data indicated that subjects generally used fluoride mouthrinse/gel appropriately. Only a small percentage of children reportedly used fluoride mouthrinse/gel before the age of 4 years. Such use is generally contraindicated, because most children this young are not able to consistently rinse and expectorate rather than swallow the mouthrinse. Approximately 4% to 12% of the study sample aged 6 to 8 years had used fluoride mouthrinse at preschool/elementary school. This supports Ripa's conclusion<sup>13</sup> that fluoride mouthrinse is one of the most widely used caries preventive measures in public health, second only to community water fluoridation. Most of the children who used fluoride mouthrinse were beyond the age of 5 to 6 years and past the "window of vulnerability" for dental fluorosis of incisors. Data indicated that less than 1% to 3% of the children aged 12 to 48 months, however, used fluoride mouthrinse or gel at home or preschool. Those individuals could be at increased risk for fluorosis.

There are no previously published data concerning the patterns of fluoride mouthrinse use longitudinally by children. The prevalence of home use of fluoride mouthrinse is comparable, however, to that of the 1989 US National Health Interview Surveys<sup>25</sup> (1% vs 4% for ages 2 to 4 years and 10% vs 9% for ages 5 to 8 years, respectively), but the preschool/elementary school use of these Iowans in

the present study was lower than that of the national survey<sup>25</sup> (8% vs 16% for ages 5 to 8 years, respectively). This report's findings in this report are important because they add to our knowledge about the patterns of fluoride mouthrinse use in children longitudinally. The primary findings are that about 2% to 3% of children were using fluoride mouthrinse or gel at 3 to 4 years of age, and the proportion increased as the children became older.

### Conclusions

Based on this study's results, the following conclusions can be made:

1. The percentages of children with any fluoride mouthrinse or gel use at home or mouthrinse use at preschool/elementary school was relatively low and increased with age.
2. Fluoride mouthrinse use at preschool/elementary school was consistently lower than mouthrinse or gel use at home.
3. There were no significant associations between either:
  - a. fluoride mouthrinse/gel use at home or mouthrinse use at preschool/elementary school;
  - b. demographic covariates.

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