



## School Based Fluoride Mouth Rinse Program and its Effect on Dental Caries - A Systematic Review

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### ABSTRACT

Schools provide an ideal set up for the promotion of oral health education and prevention activities. School fluoride mouthrinse programs can be administered by the school personnel who are trained in mouth rinsing procedures and in safe storage of fluoride, according to individual state regulations. It can help reducing the prevalence of caries among school going children of all ages. The aim of this review is to evaluate the effect of school based mouth rinse program in reducing dental caries among school children. A literature review was performed using medline, PubMed, science direct, Cochrane, Scopus using MeSH term School-based fluoride mouthrinse programs and dental caries. Of a total 372 appeared from various sources; all articles were screened and 13 were related to the research question. This review was reported according to the PRISMA guidelines. In the available literature, School fluoride mouthrinse programs are inexpensive compared to professionally applied fluorides, especially when volunteers are used. It is evident from the present literature search that they reduce the prevalence of caries in school children.

**Keywords:** School-based fluoride mouthrinse programs, dental caries, school children, systematic review.

### INTRODUCTION

A school-based fluoride program can be defined as the coordinated fluoride usage for students from age 6 to 18 in a specific school environment. These School-based fluoride mouthrinse (S-FMR), supplementary and fluoridated toothpaste programs were designed during the period of 70s and 80s for delivery of fluoride to all children studying in schools as an alternative to community water fluoridation. Fluoride products have been widely available only since the 1990s and caries rates have decreased, and many other targeted strategies are balancing caries reduction while minimizing dental fluorosis.<sup>1</sup>

Dental decay, being entirely preventable, is more common in school-aged children. Programs targeting the prevention of dental caries in these populations involve multiple components, one among that is the optimal use of fluoride.<sup>2</sup>

Dental caries, also known as cavities, is the most common disease occurring in childhood. In addition, science has shown that children during their birth are not born with the bacteria that can cause tooth decay. The bacteria *Streptococcus Mutans* is passed on the children from their parents or caregivers usually before the age of two.<sup>3</sup>

The fluoride mouthrinse program in schools takes a total of less than five minutes of class room timing each week and it is easy to learn for the school children. The supervision of the procedure can be done easily by non-dental personnel including classroom teachers or school staff, parents, and volunteers. Even if a child were to accidentally swallow the fluoride solution during rinsing, it would not cause an adverse reaction in them.<sup>3</sup>

Not all the common people in all areas have regular access either optimally fluoridated community water supplies or other sources of fluoride. Schools provide an ideal set up for the promotion of oral health education and prevention activities.<sup>4</sup> School fluoride mouthrinse programs can be administered by the school personnel who are trained in mouth rinsing procedures and in safe storage of fluoride, according to individual state regulations. It can help reducing the prevalence of caries among school going children of all ages. Hence the aim of the study was to review the effect of school based mouth rinse program in reducing dental caries among school children.

### MATERIALS AND METHODS

#### Objective of the study

To evaluate the effect of school based mouth rinse program in reducing dental caries among school children.

#### Study Design

A systematic review of trials done on effect of school based mouth rinse program in reducing dental caries among school children was done during the period of November 2018.

#### Search Strategy

The following electronic databases were used to find articles on effect of school based mouth rinse program in reducing dental caries among school children, Medline, PubMed, Scopus, Wiley online library, Cochrane library, Prospero. Each database was searched to obtain the articles using Mesh representations.



**Inclusion Criteria:**

- Original research articles
- In vivo studies
- The articles are emphasizing on the effect of school based mouth rinse program in reducing dental caries among school children.

**Exclusion Criteria:**

- Review articles
- Articles whose abstract are only readable
- Studies that are not emphasizing on effect of school based mouth rinse program in reducing dental caries among school children.

**Search Engine:**

- Medline,
- PubMed,
- Cochrane library,
- Scopus,
- Wiley online library,
- Prospero.

**RESULTS**

The search yielded 372 records, and 13 full-text articles were independently assessed. Among these potentially eligible articles, four were included in the review.

Table 1 shows the review of articles on effect of school-based mouth rinse program in reducing dental caries among school children. It shows the interventions in all the

four studies included. Yusuke Matsuyama et al conducted a study in Japan on utilization of S-FMR using multi-year prefecture-level aggregated data of children born between 1994 and 2000. K. Divaris, R.G. Rozier, and R.S. King conducted a study in North Carolina where Program participation was quantified using FMR years. Children's caries experience was measured. Chen CJ-A et al conducted a study in Sarawak in which 270 children aged 8–9 years from four schools in Sarawak were selected. Children from two schools rinsed with 0.2% sodium fluoride under supervision, while those from the other schools did not. Satoko ohara et al., conducted a study in Japan in which students attending elementary and high school were selected. DMFT index was measured. All have shown positive outcomes. The results are discussed below.

Table 2 shows the review of articles on effect of school-based mouth rinse program in reducing dental caries among school children. It shows the results yielded in all the four studies included. Yusuke Matsuyama et al conducted a study in Japan showed that high S-FMR utilization was significantly associated with low DMFT at age 12. K. Divaris, R.G. Rozier, and R.S. King conducted a study in North Carolina showed that each 'FMR year' was associated with weak reduction of caries prevalence in the primary and the mixed dentition. Chen CJ-A et al conducted a study in Sarawak in which the risk of developing caries decreased 0.52 times among the children from the 'test' group exposed to the fluoride mouth rinsing programme as compared to the unexposed 'control' group.. Satoko ohara et al., conducted a study in Japan in which a significant decrease was observed in overall prevalence of dental caries especially in molars.

**Table 1:** Review of articles on effect of school based mouth rinse program in reducing dental caries

S NO	Author	Year	Study area	Intervention
1.	Yusuke Matsuyama et al <sup>5</sup>	2016	Japan	Ecological study on utilization of S-FMR using multi-year prefecture-level aggregated data of children born between 1994 and 2000
2.	K. Divaris, R.G. Rozier, and R.S. King <sup>6</sup>	2012	North Carolina	Program participation was quantified using FMR years. Children's caries experience was measured.
3.	Chen CJ-A et al <sup>7</sup>	2010	Sarawak	270 children aged 8–9 years from four schools in Sarawak were selected. Children from two schools rinsed with 0.2% sodium fluoride under supervision, while those from the other schools did not.
4.	Satoko ohara et al <sup>8</sup>	2000	Japan	Students attending elementary and high school were selected. DMFT index was measured.

**Table 2:** Review of articles on results of school based mouth rinse program in reducing dental caries

S No	Author	Year	Study area	Outcome
1.	Yusuke Matsuyama et al <sup>5</sup>	2016	Japan	High S-FMR utilization was significantly associated with low DMFT at age 12
2.	K. Divaris, R.G. Rozier, and R.S. King <sup>6</sup>	2012	North Carolina	Each 'FMR year' was associated with weak reduction of caries prevalence in the primary and the mixed dentition.
3.	Chen CJ-A et al <sup>7</sup>	2010	Sarawak	The risk of developing caries decreased 0.52 times among the children from the 'test' group exposed to the fluoride mouth rinsing programme as compared to the unexposed 'control' group.
4.	Satoko ohara et al <sup>8</sup>	2000	Japan	Significant decrease was observed in overall prevalence of dental caries especially in molars.



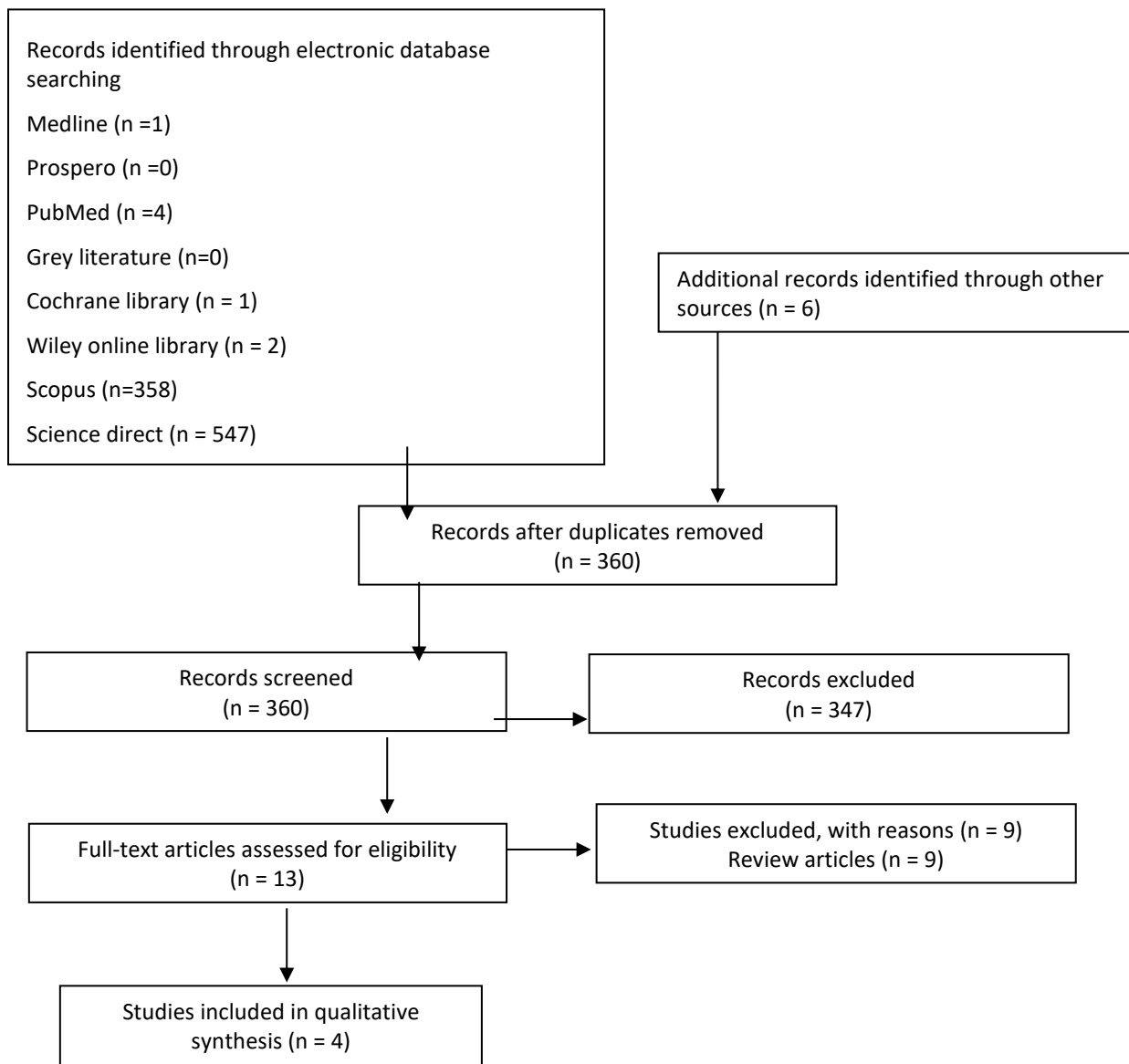
**Figure 1:** Flow diagram showing the number of studies identified, screened, assessed for eligibility, excluded and included in the systematic review

Figure 1 shows the flow diagram of the reports that were identified, screened, assessed for eligibility, excluded and included in the review. It shows that total 372 articles were yielded by searching different databases. After removing duplicates and others, a total of 4 full text articles fulfilling the inclusion criterias were included in the study.

## DISCUSSION

School-based oral health programs provide children a chance to experience what optimal oral health is, but at the same time developing some relevant programs that address the need of today's children is a difficult task. School based oral health preventive programs that are designed to help children must be relevant and offer interventions based on their needs rather than being a mere preventive strategy.<sup>9</sup>

Horowitz and Frasier<sup>10</sup> have provided a complete description of fluoride combinations and appropriate use of self-applied fluoride regimen. Rinsing programs are advised for grade 1 to grade 12 children but not below. In general

the fluoride mouth rinses results in significant caries reduction of about 30% to 35%. School based fluoride programs were evaluated and subsequently, many other states adopted such programs for their communities, particularly in non-fluoridated areas. These programs had much of co-operation because cost for supplies was low and the regimen could be supervised readily even by school teachers, teacher aids or volunteers after a minimal in-service training.

Yusuke Matsuyama et al conducted a study in Japan showed that high S-FMR utilization was significantly associated with low DMFT at age 12.<sup>5</sup> K. Divaris, R.G. Rozier, and R.S. King conducted a study in North Carolina showed

that each 'FMR year' was associated with weak reduction of caries prevalence in the primary and the mixed dentition.<sup>6</sup> Chen CJ-A et al., conducted a study in Sarawak in which the risk of developing caries decreased 0.52 times among the children from the 'test' group exposed to the fluoride mouth rinsing programme as compared to the unexposed 'control' group.<sup>7</sup> Satoko Ohara et al., conducted a study in Japan in which a significant decrease was observed in overall prevalence of dental caries especially in molars.<sup>8</sup>

Steve Mn. A da in 1998 stated that a safer means of caries protection is providing fluoride mouthrinses to children and adults in fluoride-deficient areas and, to a lesser extent, in optimally fluoridated communities.<sup>11</sup>

## CONCLUSION

School fluoride mouthrinse programs are inexpensive compared to professionally applied fluorides, especially when volunteers are used. It is evident from the present literature search that they reduce the prevalence of caries in school children. Such programmes must be implemented worldwide to benefit all children.

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