

Research Article

An Integration of Varnish Fluoride Therapy in Primary Health Care and the Role of Primary Health Care Practitioners in the Control of Early Childhood Caries: A Pilot Study

Mohammad Hossein Khoshnavisan^a, Hamid Sammadzadeh^a, Shokofeh Banaei^c, Nadereh Moosavi Fatemi^a,
Mohammad Hossein Karimi^a, Frahnaz Ezzati^b, Alireza Rahimi^b, Masoud Shabani^{b*}

^aOral Health Bureau, Iranian Ministry of Health, Tehran, Iran

^bDeputy for Health, Ardabil University of Medical Sciences, Ardabil, Iran

^cDepartment of Physiology, Ardabil University of Medical Sciences, Ardabil, Iran

Correspondence

Masoud Shabani,
Deputy for Health, Ardabil University of
Medical Sciences, Ardabil, Iran.
Tel/Fax: +9821-22421813
Email: m.shabani@arums.ac.ir

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Abstract

Purpose: To assess the effect of varnish fluoride therapy accompanying routine oral health care in order to reduce primary tooth caries and early childhood caries.

Methods: The current experimental study was conducted on 130 younger-than-two-year-old children. The samples were randomly divided into two groups (experimental group, n=65, and control group, n=65). At first, primary health practitioners were trained and qualified for varnish fluoride therapy. After getting written signed parental consent, varnish fluoride therapy was started as soon as the primary teeth emerged from gingival tissue in experimental group and conducted with regular primary dental caries prevention care once every three months. The control group just received regular primary dental caries prevention care. After two years, decayed, missing, and filled teeth (DMFT) index was measured based on WHO questionnaire by two examiners in both groups. Data analysis was done by SPSS Statistical software Package.

Results: Varnish fluoride therapy resulted in lower DMFT index in experimental group than in control group. Anterior primary tooth caries (central and lateral incisors) was reduced more in experimental group than in control group. Also, caries reduction for central anterior tooth in experimental group was greater than that of control group but the difference was not statically significant.

Conclusions: Under the conditions of the present study, the integration of varnish fluoride therapy into health system and its delivery by primary healthcare practitioners can result in lower DMFT index as well as improved target-population coverage.

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Introduction

Caries is a common chronic disease [1, 2] for which various preventive methods have been suggested. One method is to use the compounds of fluoride. The effectiveness of fluoride in preventing the caries is well-proven [3]. It is used for preventing the caries in different ways [4, 5, 6] one of which is varnish fluoride. This compound can be readily used by children [7] so that American Academy of Pediatrics recommends its use immediately after the emergence of teeth [3].

Deciduous teeth caries is a critical health risk for children's age group so that DMFT index is 1.9 for 3-year-old children and 5 for 6-year-old children [8]. Following the integration of primary oral

health with primary health care, the service package for children has considered some measures to prevent the caries of deciduous teeth including training and consulting services for mothers to protect children's oral health, improving caries-free feeding skills (including the use of mother mild and avoiding nursing bottle as well as cleaning children's teeth after breast-feeding), cleaning children's teeth with baby toothbrush and/or wet gauze twice a day, using cups for drinks as fast as possible, reducing the amount of sugars in diet, taking annual screening examinations, estimating the risk of caries, training the prevention of bad habits and visiting higher levels for medical care and prevention [9].

Given the fact that the selection of simple preventive methods for oral diseases which can be integrated with primary care is a

research priority [10] on the one hand and that a good deal of research is required to select the best service pattern and package for preventing primary tooth caries [11] on the other hand, the present study was carried out to estimate the effectiveness of the use of varnish fluoride therapy by health practitioners in obtaining a suitable coverage in applying this therapy alongside oral health service package for improving DMFT index for 2-year-old children.

Methods

The present experimental study was conducted after receiving the permission (ARUMS.REC.1392.8) from the Ethical Committee of Medical Sciences University of Ardabil, Iran. The data were collected for 130 two-year-old children by using questionnaires. First two dentists were calibrated as examiner and after reaching the agreement coefficient of 0.85, the oral examinations were carried out by examiners in blind way for determining DMFT index. The subjects were composed of 2-year-old children. Children born in 2012 were registered in the study at the age of 4 months. Then, they were randomly divided into intervention and control groups. At the age of six months and immediately after the emergence of primary teeth, the control group received routine care and annual screening examinations, their parents were trained and received motivational consultation, their oral system was taken care of by parents with cleaning their teeth with baby toothbrush (finger tooth brush) and wet sterile gauze, their risk of caries was estimated and their parents were trained about how to use risk assessment card, to cut back the amount of sugars in their diet, to feed them with caries-free foods. These cares were repeated once every three months. The intervention group was, in addition, exposed to varnish fluoride (sodium fluoride 5%, varnish 0.5 ml). The practitioners were already trained about varnish fluoride therapy and practiced it on plastic models. The varnish fluoride therapy was done in Health Center after the receiving parental consent.

To do varnish fluoride therapy, first the practitioner and the mother sat down knee-to-knee and then the child was put on mother's thigh so that his head was on practitioner's thigh and his feet was on his mother's thigh.

Then, the practitioner opened the patient's mouth and brushed his/her teeth with dry baby toothbrush to remind how to clean the teeth with toothbrush and also to clean baby's teeth before varnish fluoride therapy. Then, the teeth were dried and cleaned with gauze and as the patient's mouth was kept open and his tongue was kept aside by thumb and index fingers, a thin layer of varnish fluoride (after mixing of varnish in its container by its brush) was painted on the surface of all teeth. This procedure started immediately after the emergence of teeth from gum. After painting varnish fluoride, the spot was kept dry and isolated for some moments in order for varnish to adhere to the teeth. Afterwards, the parents were told that the child was not allowed to eat or drink for two hours. The child's brushing started from the morning of the day after varnish fluoride therapy. The children of both groups were called to service area once every three months to receive healthcare service for control and healthcare service + varnish fluoride therapy for intervention group with records kept on special cards.

After the children reached the age of 2 years old – indeed 18 months after the emergence of teeth during which they were exposed to varnish fluoride therapy six times (on average) – DMFT index was measured for both groups. The background information were studied including gender, parents' literacy, living area, adherence to caries-free feeding, caries-free breastfeeding, the application of antibiotics, the use of baby toothbrush, the use of wet gauze, and daily frequency of breastfeeding.

The criteria for inclusion in the study were (1) the initiation of deciduous-teeth growth, (2) parents' satisfaction, (3) commitment to on-time attendance to services, and (4) the disuse of other fluoride compounds. The criteria for exclusion from the study included (1) parents' dissatisfaction, (2) allergic to varnish fluoride, (3) specific systemic complications, and (4) taking fluoride in ways other than specified. The criteria for exit from the study were (1) immigration so that receiving the services was impossible, (2) allergic to varnish fluoride during the study, and (3) lack of observation of the routine care.

Sixty-five children were studied in intervention group and 65 children in control group. Dental examinations were carried out by two dentists with the agreement coefficient of 0.85.

Results

The mean age at the first session to initiate varnish fluoride therapy was 9.38 months for intervention group and 9.34 months for control group. 47.3% of the participants were male and 52.3% were female.

Table 1 shows that DMFT reduction of the intervention group, i.e. the group that received varnish fluoride in addition to primary care service package was significantly higher than that of the control group ($P < 0.001$).

Since there is no rigid definition for early childhood caries (ECC) and it varies from the caries of one central primary tooth to the caries of several teeth, the effect of varnish fluoride in preventing ECC was indicated by DMFT for four upper and lower front teeth as well as DMFT for upper and lower central and upper and lower lateral primary teeth. Table 2 reveals significant difference in the influence of varnish fluoride on reducing ECC in intervention group as compared to control group.

ECC of caries of primary central teeth significantly improved more in intervention group than in control group, but the

Table 1. Total DMFT in intervention and control groups.

Groups	Intervention		Control		Means difference	Sig. (2-tail)
	Mean	SD	Mean	SD		
DMFT	0.76	0.46	1.4	0.65	0.64	0.000

Table 2. DMFT of intervention and control groups for four front teeth and central and lateral incisors.

DMFT	Intervention		Control		Means difference	Sig. (2-tail)
	Mean	SD	Mean	SD		
Total DMFT of central and laterals teeth	0.59	0.52	0.92	0.77	0.33	0.005
DMFT of centrals teeth	0.15	0.36	0.45	0.50	0.29	0.000
DMFT of laterals teeth	0.43	0.53	0.46	0.53	0.032	0.73

difference was not significant for the caries of primary lateral teeth.

Discussion

Although the influence of varnish fluoride on prevention of teeth caries is related to the intrinsic properties of fluoride [3], studies are required to well prove their effectiveness [12].

As the present study revealed, the application of varnish fluoride is one of the most effective methods for preventing deciduous teeth caries including early childhood caries (ECC).

As Garcia [11] states the use of toothpaste and varnish fluoride is relevant in the prevention of deciduous teeth caries. Ricks [13] observed the decrease in caries with the use of varnish fluoride along with other oral health care. Also, Sharma et al. [14] suggest that varnish fluoride can stop the process of caries.

The results of the present study are in agreement with Rolnicks et al. [15] who studied the application of varnish fluoride for 1-5-year old children in a nation-wide program.

Some effective measures for preventing deciduous tooth caries have been proposed as training oral health care [16], lower sugar consumption [17, 18], wiping infants' teeth [19, 20], increasing caregivers' knowledge and skills [21], using cup from the age of 3-12 months [22], abandoning the use of nursing bottle [23], screening examinations and the use of caries risk level assessment tools [18, 24], consulting with and motivating of caregivers [25] and integrating oral health services with other services offered by health practitioners including measures to prevent deciduous tooth caries. In addition to these services, the use of fluoride can bring about better results.

In the present study, the varnish fluoride therapy was delivered with the service package of caregivers' training and consultation about oral healthcare, cleaning teeth with baby toothbrush and wet clean cloth, screening examinations and caries risk assessment procedure, and lower sugar consumption which is consistent with Jones [26] who recommended the delivery of varnish fluoride service with caries risk assessment. It is also in agreement with Douglass [27] who revealed that service delivery with consultation services can reduce deciduous tooth caries. Chou [28, 29] suggests that screening cares + supplementary fluoride application can reduce caries. Varnish fluoride type has been used in most studies.

The use of dental assistants such as health practitioner in providing varnish fluoride therapy was a specific feature of the present study which revealed a new capability in healthcare practitioners for optimum coverage of varnish fluoride service. Jones [26] and Hatim [30], also, used assistants in their study as a strong team for providing varnish fluoride services. Csikarji [31] also used other healthcare practitioners for providing varnish fluoride service.

Conclusion

It is concluded that under the conditions of the present study, the integration of varnish fluoride therapy into health system and its delivery by primary healthcare practitioners can result in lower DMFT index in addition to optimum coverage.

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Competing interest

The authors declare that they have no competing interests.

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