

Effect of Fluoride Varnish in Prevention of Dental Caries

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ABSTRACT

Objective: To assess the effect of 5% sodium fluoride (NaF) varnish application in prevention of caries in mixed dentition rural Jamshoro school children over the course of 6 months.

Methods: children with lower stage caries aged 7 to 10 years were included. Students were equally divided in two groups. In Group-A students, 5% fluoride varnish was applied. While in children of control group necessary instructions were given to the student about dietary control. After 3 months, varnish applied teeth on both group's children were examined again and the rate of caries were documented by using DMFT. After 3 months fluoride varnish was applied to both groups using same method and same directives. Dental caries was examined using the DMFT score after six months of application of fluoride varnish in both groups. All the data was recorded in the proforma.

Results: In this study total 108 children were studied, there was no significant difference according to age and brush frequency among both groups p-value 0.146 and 0.088 respectively. Most of the children were using brush among both groups. A starting of the trail mean of DMFT was 1.22+0.24 in group A and 1.39+0.56 in group B. After 3 months it was almost equal among both groups as, while on six months assessment DMFT was raised in control group in contrast to test group p-value 0.012

Conclusion: It was concluded there was significant preventive effect/impact of fluoride varnish on dental caries. DMFT was raised in control group during 6 months rather than test group.

Keywords: Children, Dental caries, Fluoride varnish

INTRODUCTION

Oral health is important for appearance and essential element of general health. Oral health affects the quality of life directly. The negligence of oral hygiene may cause oral diseases, which have a huge effect on overall wellbeing of children^{1,2}. One of the highly extensive chronic infectious childhood disease is Dental Caries, which can be manageable and even prevented at both individual and population levels³. Dental caries may greatly influence not only the life of child but may also have some consequences on their families, their concentration in school and incoming life^{4,5,6}. The condition affects an enormous number of children, and a clear socioeconomic slope is noticeable⁷. Dental caries can lead to tooth ache, discomfort, loss of tooth and often delay language development, learning and eating problems.

There is variety of management options to address this issue and fluoride varnish application is one of them, Fluoride varnish is a synthetic base or liquid resin. Fluoride varnish inhibit demineralization action, promotes remineralization of tooth enamel and reversing early cavitation, it sets speedily on contact with teeth and produce maximum absorption of fluoride than any other professionally applied fluoride gels or foams; therefore smaller quantity is required. Fluoride varnish provides benefits to children having moderate or high-risk dental caries⁹. It contain about 5% fluoride¹⁰. A Variety Of studies have been performed to observe the influence of fluoride varnish on dental caries and to analyze the impact of fluoride varnish on primary and permanent dentition various clinical trial studies has been conducted¹. Peterson's studies have displayed that fluoride varnish use is more successful than any other contemporary fluoride in tooth decay prevention. In various studies, a 75% positive result has been reported. Unlike fluoride gels that requires specific equipment and availability of clinic, varnish can be used widely in the community¹¹. Additionally, for that secondary assessment was performed to investigate the efficacy of single application of sodium fluoride (NaF) varnish in six months on caries reduction. This trial tests the efficiency of 5% sodium fluoride (NaF) varnish application in avoiding caries experiences in mixed dentition among deprived rural school children¹⁰. The objective of this study is, consequently, to assess the impact of fluoride varnish application in children as an additional measure to a preventive program comprising of school-

based oral health education. As seen in literature as simple preventive measure like application of fluoride varnish can be helpful in prevention of dental caries in underserved community which can be very beneficial in developing country like Pakistan and it's rural areas like Jamshoro, Sindh.

MATERIAL AND METHODS

This is a Comparative Observational study with non probability convenience sampling method. The study was performed on 108 subjects (calculation in determined by using Clinaclic software). The study was carried out Govt. Girls GOR School Jamshoro, Hyderabad from 5th January 2018 to 5th July 2018

Inclusion Criteria:

- Children with lower stage caries
- Students aged between 7 to 13 years.
- Either gender.

Exclusion criteria:

- Students whose parents don't allow their child to participate.
- Students above or below age.

Data collection procedure: This study was operated after consent of ethical review committee of Liaquat University Hospital Hyderabad. One hundred eight lower stage carries students were selected after oral examination. Written consent form was obtained from principal of school for the permission to perform and from the parents of participants. Students were equally divided in two groups 54 in each group. In Group-A students, 5% fluoride varnish was applied in both arches with the help of disposable gloves and brush/applicator. Separate disposable varnish packet was used for each student. The varnish fixes after saliva reaches on the teeth. While in children of control group only necessary instructions were given to the student about dietary control and oral hygiene instruction. Children of test group were advised not to brush and floss for 04 to 06 hours after application of varnish to the children, as well as a written pamphlet was send to their homes for. After three months, applied varnish on the teeth of both groups children were assess again and the rate of tooth decay were noted by using DMFT.

After 3 months fluoride varnish was applied to both groups using same method and same directives. Dental caries were

examined using the DMFT score after six months of application of fluoride varnish in both groups. The whole data was recorded in the proforma.

Data analysis: Data was evaluated by using SPSS version 20. Qualitative variables: frequency and percentage were used. Quantitative variables: mean and standard deviation were used. T-test was used to assess the quantitative variables and chi-square test was employed to evaluate qualitative variables among both groups and a significant considered p-value was <0.05.

RESULTS

In this study total 108 children were studied, there was no significant difference according to age among both groups as mean age of A group was 9.17+1.02 years and 10.46+1.07 years of B group p-value 0.146. **Table: no.1.**

No significant difference was found among both groups according to truth brushing time p-value 0.267. Most of the children had brushing habits in the morning among both groups as 26 children of A group and 27 of B group. At noon brushing habit was in 2 children of A group and in 6 children of B group. Before going to bed brushing done by 3 children of A group and 5 children of B group, while 23 children nothing done brushing in A group and 15 in B group respectively. **Figure: no.1.**

According to truth brushing frequency, 21 children of A group and 27 of B group done brushing once a day, 2 from A group and 4 from B group had done brushing twice a day, 8 children of A group and 11 of B group had brushing habits some time, while 23 children nothing done brushing in A group and 15 in B group respectively, there was no significant difference according to brush frequency among both groups p-value 0.088. **Table: no.2.**

Most of the children were using brush among both groups 29 of A group and 40 of B group, 2 patient were using Miswak from each group, while 23 children nothing done brushing in A group and 15 in B group respectively, there was no significant difference according to brush frequency among both groups p-value 0.060. **Table: no.3.**

Most of the children 41 of group A and 46 of group B were not using dental floss, only 5 children of group A and 4 of group B were using dental floss, while 8 children of A group and 4 of B group were don't know regarding it, p-value 0.421. **Table: no.4.**

Table:1 Mean age comparison among both groups n=108

Age	Study groups	
	Test group	Control Group
Mean+SD	9.17+1.02	10.46+1.07

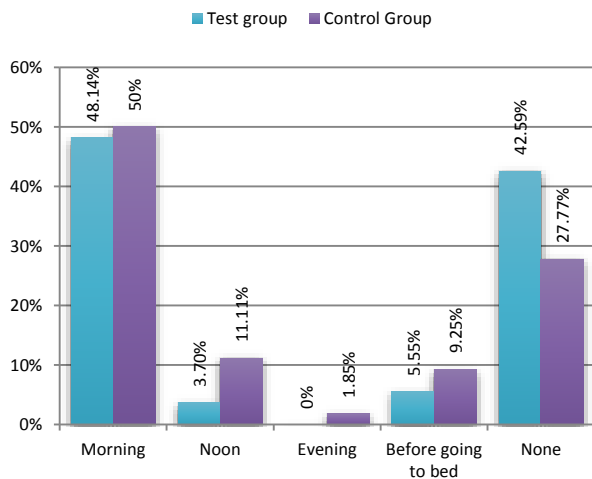


Figure 1: Time comparison of brushing among both groups

A starting of the trail mean of dmft was 0.51+0.33 in A group and 0.54+0.15 in B group without significant difference p-value 0.783. After 3 months it was almost equal among both groups as 0.40+0.29 in A group and 0.52+0.13 in B group, p-value 0.092, while on six months assessment DMFT was raised in control group as 2.11+0.71 in control group in contrast to test group as 0.31+0.25, p-value 0.019. A starting of the trail mean of DMFT was 1.22+0.24 in A group and 1.39+0.56 in B group without significant difference p-value 0.084. After 3 months it was almost equal among both groups as 1.22+0.42 in A group and 1.41+0.56 in B group, p-value 0.076, while on six months assessment DMFT was raised in control group as 2.11+0.71 in control group in contrast to test group as 1.31+0.88, p-value 0.012. **Table: no.5**

Table 2: Truth brushing frequency among both groups n=108

Tooth brushing frequency	Study groups	
	Test group	Control Group
Once	21	27
Twice	2	04
Some timing	8	11
None	23	12
Total	54	54

Table 3: Truth brushing devices among both groups n=108

Tooth brushing devices	Study groups		p-value
	Test group	Control Group	
Brush	29	40	0.060
Miswak	02	02	
Null	23	12	
Total	54	54	

Table 4: Frequency of dental floss among both groups n=108

Dental floss	Study groups		p-value
	Test group	Control Group	
Yes	05	04	0.421
No	41	46	
Don't know	08	04	
Total	54	54	

Table 5: dmft and DMFT comparison at Starting, after 3 months and after 6 months among both Groups

		Test group	Control Group	p-value
dmft	A starting (mean+SD)	0.51+0.33	0.54+0.15	0.783
	After 3 months (mean+SD)	0.40+0.29	0.52+0.13	0.092
	After 6 months (mean+SD)	0.31+0.25	0.51+0.45	0.019
DMFT	A starting (mean+SD)	1.22+0.24	1.39+0.56	0.084
	After 3 months (mean+SD)	1.22+0.42	1.41+0.56	0.076
	After 6 months (mean+SD)	1.31+0.88	2.11+0.71	0.012

DISCUSSION

In this study total 108 children were studied, there was no significant difference according to age among both groups as mean age of group A was 9.17+1.02 years and 10.46+1.07 years

of group B p-value 0.146. Similar results were reported by Mohammadi TM et al.¹² In this study most of the children had brushing habits in the morning among both children groups i.e. 26 of A group and 27 of B group. 21 of A group and 27 of B group children done brushing once a day. Most of the children were using brush among both groups 29 of A group and 40 of B group, 2 patients were using Miswak from each group, while 23 children nothing done brushing in A group and 15 in B group respectively, there was no significant difference according to brush frequency among both groups. These findings were similar to study of Casanova-Rosado JF et al¹³ and Retnaningsih D et al.¹⁴

In this study at starting of the trail mean of DMFT was 1.22+0.24 in A group and 1.39+0.56 in B group without significant difference p-value 0.084. After 3 months it was almost equal among both groups as 1.22+0.42 in A group and 1.41+0.56 in B group, p-value 0.076, while on six months assessment DMFT was raised in control group as 2.11+0.71 in control group in contrast to test group as 1.31+0.88, p-value 0.019. Similar findings reported by Casanova-Rosado JF et al,¹³ in Phase 1 and 2 (P = 0.05), there was significant mean DMFT difference in the test group but in Phase 2 and 3 (P = 0.07) there was no difference significantly. In control group, the difference between Phase 1 and 2 (P = 0.09) was not significant but in between Phase 1 and 3 (P = 0.03), it was significant. Kallestall et al¹⁵ operated a methodical analysis of economic evaluations of various caries preventions conducted in the period of 1966 - 2003. They acknowledged only two original controlled case studies that encompassed of an economic assessment with follow-up of 04 years: first one was of Sweden, which displayed comparable cost-efficiency between the control group and the cases, and other one was of Finland Vehmanen Ret al¹⁶ which displayed over the time of 4 years, cost-efficiency ratio was of 1.8 in support of fluoride varnish. The sources confirmed that there was insufficient proof for the fluoride varnish technique's economic value. Not Long Ago, Quinonez et al¹⁷ assessed the cost efficiency of universal fluoride varnish application in the interval of 9, 18, 24 and 36 months with absence of medical workers involvement. The fluoride treatment, if provided, was applied within a well-infant regular health inspection schedule for 09-42 months aged children who were getting healthcare via Medicaid. They confirmed that the fluoride varnish use is efficient in the professional medical arrangement in decreasing tooth decay in early childhood in poverty-stricken populations but does not effective in reducing Medicaid expense in the first 42 months of infant. Hawkins et al¹⁸ assessed the comparison of the patient acceptance and the cost of two techniques of professional treatment of topical fluorides i.e. foam and varnish, and discovered that varnish is significantly less time consuming and also there seemed to be few significant signs of gagging irritation than foam application. For 3 to 6 years old children, the varnish application cost, that includes labor, was noticeably less. Numerous evaluations of the application of fluoride therapies in averting tooth decay have been printed since 2000,^{19,20} including two reports based on evidence.^{21,22} The Cochrane assessments of this topic evaluated that in a year, two to four times professionally applied Fluoride varnishes would noticeably reduce dental caries in children. The analysis of trials indicates that fluoride varnish can greatly decrease caries in both permanent and primary teeth. Yet, further extensive investigation is required to be certain of the success of the treatment in comparison to others, and also further, to study its suitability and side effects.²¹ In most US states, young children treatment of applying fluoride varnish are being reimbursed by Medicaid programs. But still, not many experiments have studied the obstacles and motivators of clinician participation. One study discovered less than 33% of their respondents' medical clinicians listed to provide Fluoride varnish actually offered that service.²³ The most widespread rationale reported for their not offering Fluoride varnish was inept training. One More research in North Carolina studied various strategies of training regarding the Fluoride varnish application. They discovered that the technique and intensity of training had no substantial effect on the rate of

Fluoride varnish used described by Slade et al.²⁴ As A Matter Of Fact, only a few more than half of all their partaking medical practices, irrespective of trial group, had offered Fluoride varnish during the trial. The assessment for applying topical fluoride professionally should be established on evaluating the condition of risk of dental caries and this treatment is ideally applied by professional dentist through a family-oriented, comprehensive, professionally coordinated, easily accessible oral health care program.^{24,25} The Frequency of receiving fluoride varnish for primary or permanent teeth in effectively avoiding moderate risk dental caries should be after every 6 months and for high risk ,getting fluoride varnish after every 03 months may offer an supplementary caries-prevention benefit.^{26,27} In a research of children ages between 3 to 5 enrolled in Head Start in receiving fluoride varnish treatment, after 9 months follow up showed that active caries of 81% children were became inactive, in comparison with 38% children who were not provided with treatment of fluoride varnish.²⁸ In another research, a caries prevention program was introduced at an urban pediatric clinic who serves low-income families, children ages between 06 to 27 months who received oral hygiene directives, caries-risk valuation, fluoride varnish application, referral for treatment (if required), and intermittent check-up showed a significantly lower occurrence of caries as compared in group who did not obtain these services.²⁹

A methodical assessment on clinical trials centered on the effectiveness of fluoride usage was conducted, in 2004 by Peterson et al³⁰. Quinonez et al¹⁷ also stated a yearly basis decrease of 28 percent in childhood caries was observed when fluoride varnish was used, and result were consistent throughout the study. In an old study of Mehran et al³¹ stated 21 percent increase of caries in the control group of children aged 1 to 3 years in comparison to the those who were offered fluoride varnish. Various reports have indicated the positive impact of fluoride varnish in reducing dental caries. Clinical trial research has informed copious outcomes concerning the impact of fluoride varnish on permanent and deciduous dentition.³¹ In 2006, Weintraub's clinical research also informs the decreasing effect of varnish on caries.³²

CONCLUSION

"It was concluded fluoride varnish has preventive effect on dental caries. The reduction in caries was obvious although this was a short-term study, therefore it is optimistically said that the continual treatment of varnish in children, which emphasis by Pakistan's Health Ministry, will greatly facilitate in improving the oral health of children. Furthermore, it is recommended that the varnish impact on children's permanent teeth, in across the country, should be analyzed in larger samples on long-term basis."

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