

*A randomized clinical trial on arresting dentine caries in preschool children by topical fluorides – 18 month results* was published in Journal of Dentistry in the year 2016 by the scientists from The University of Hong Kong D. Duangthip, C.H. Chu, and E.C.M. Lo. Three topical fluoride application protocols in arresting dentine caries in primary teeth of preschool children in a fluoridated area were compared in effectiveness. For that three experimental groups of 3-4 years old children who have at least one cavity were formed. Children from the first group were recommended to apply 30% silver diamine fluoride solution every 12 months; children from the second group received three applications of the same solution at a weekly interval at baseline, and children from the third group received three applications of 5% sodium fluoride varnish at a weekly interval at baseline. One of the researchers performed follow-up examination every half a year. As the result caries, arrest rates were 40%, 35%, and 27% respectively. Therefore, authors concluded that annual or three consecutive applications of 30% silver diamine fluoride solution are more effective in arresting caries in primary teeth than applying NaF varnish.

This is the scholarly source because the paper represents original research published in the scientific peer-reviewed journal. It was initially received by the journal on 27 March 2015, but returned to the authors with comments of the experts in the area, and received for the second revision only one month later, and published after careful consideration two months after the first submission. It provides the citations for all sources that are used in the article, and all of them are scholarly as well.

The first author of the paper is Duangporn Duangthip, DDS, Dr.med.dent, Ph.D., and the postdoctoral researcher at the Faculty of Dentistry of The University of Hong Kong. Since September 2003 she co-authored 22 scientific peer-reviewed articles, and, therefore, has all the qualifications and experience necessary to publish a scientific article. The second author, Dr. Chun-Hung Chu, is a Clinical Professor at the Faculty of Dentistry of The University of Hong Kong. He is also a fellow of

the Royal Australasian College of Dental Surgeons, the fellow in Dental Surgery of the Royal College of Surgeons of Edinburgh, master of the Academy of General Dentistry and diplomate of the American Board of General Dentistry. He authored 172 scientific peer-reviewed articles. Another author is Dr. Edward Lo, the researcher from The University of Hong Kong and co-author of 338 scientific articles.

The purpose of the paper is stated very clear, As early childhood caries is a global health problem that decreases the life quality of young kids, finding out a proper method of arresting dentine caries in primary teeth of preschool children in a fluoridated area is an important clinical task.

A total of 304 children with cavities were picked up as the research subjects from 15 kindergartens in Hong Kong, where kids drink fluoridated water. They were randomly divided into three nearly equal groups, each of those received different experimental treatment. Children from the first group were treated with 30% silver diamine fluoride solution at a baseline, and then every 12 months; children from the second group were treated with 30% silver diamine fluoride solution at weekly interval at a baseline, and children from the third group were treated with 5% NaF varnish at weekly interval at a baseline. The solutions were applied on the cavities during 10 seconds time without any prior treatment of caries. At 12 months follow-up kids from the second and the third group were treated with water as a placebo. The examination was performed using a double-blind method: neither subjects nor scientists knew in which group kids are allocated. The data were analyzed using SSPS and WinBUGS software. Statistical analysis was performed with Cohen's Kappa statistics, Chi square test, and ANOVA package.

Though scientists placebo-treated the third and the second experimental groups at one-year follow-up, in my opinion, the study misses the placebo-treated group that would receive neither 30% silver diamine fluoride solution nor 5% NaF varnish treatment. This group would play a role of the negative control and allow to eliminate the false positive results that could be associated with the

change of the diet of the patients, or an increased quality of oral hygiene after parents got to know that their kids have cavities.

The initial sample included 304 children aged 3-4 years from 15 kindergartens in Hong Kong, and by the end of the study 275 children remained. All children had at least one cavity, and in total the researchers investigated 1670 tooth surfaces with dentine caries, which makes more than 5 cavities per kid on average. In my opinion, the sample had to be selected more carefully. The researchers might receive additional information in case they would group kids according to the number of cavities they already have. For example, children who have one or two cavities would be the first subgroup, and the kids with more than two cavities would be the second. Likewise, it would have been possible to define how the suggested treatment performs in kids with different dietary habits and how the success of the treatment correlates with the oral hygiene level.

All the data were input in the computer and analyzed using SPSS 20.0 and WinBUGS 1.4. software. The statistical methods used were Cohen's Kappa statistics, Chi-square test, and ANOVA. The level of statistical significance was set a standard for the medical research: 0.05. The results of statistical analysis look reliable, and the tests used are appropriate for the analysis of the three sets of data with a different number of subjects in each.

All the groups used in the research are experimental: each group of kids received treatment. To make this research more professional positive and negative control groups might have been useful. Children receiving placebo treatment could have become a negative control group: they would be treated with water at a baseline, one year, and 18 months after. The positive control could be a group of kids, who received the professional dental treatment of cavities, though in this case, the double-blind control at a baseline would become impossible. As the effectiveness of all three methods is relatively low, it would be interesting to compare it with a negative control group of placebo-treated

subjects.

18 months is an optimal duration of this experiment due to several reasons. First of all, the longer the clinical study involving kids as subjects are, the more kids fall out of the study for many reasons (their parents can move, they can get sick, etc.). Secondly, the longer study runs, the more variables intervene in it, and the more difficult it is to track the correlation between the variables relevant to the research.

The study aimed to compare the effectiveness of three topical fluoride application processes, which help to arrest dentine caries in primary teeth of preschoolers who drink fluoridated water. The statistical analysis of the results revealed that after one and a half year caries arrests of treated teeth were 40% in the group treated with 30% silver diamine fluoride solution once a year, 35% in the group treated with 30% silver diamine fluoride solution intensively, and 27% in the group treated with 5% sodium fluoride varnish at weekly interval at a baseline. The difference between the groups was found to be statistically significant.

As treatment of caries of primary teeth with 30% silver diamine fluoride solution using either protocol was found to have higher protective effect in comparison with treatment with 5% sodium fluoride varnish, the authors recommend using it more often in the clinical settings. This conclusion is logical as even though all three methods are not of high clinical efficiency, there is minimum 8% difference in efficiency of 30% silver diamine fluoride solution in comparison with 5% sodium fluoride varnish.

The findings published in the article are interesting but questionable. As far as all the treatment protocols have efficiency below 50%, there should be alternative solutions for the problem of caries cavities in the population of young children. Professional treatment of cavities or even pulling the tooth with caries out might be more effective and help to avoid unwanted complications.

Authors themselves mention that the article is missing negative controls (healthy children without cavities). They address this issue telling that only kids with cavities were included in the study, and that is why they could not form the negative control group. This explanation does not sound scientific to me. Most probably in the same population of children aged between 3 and 4, there were enough kids with healthy teeth to form a control group. Another thing I would add is a correlation between dietary habits of the children and their families, number of cavities, and success of the treatment. It may be that the treatment is ineffective because the factors that caused the caries are still in effect. Unfortunately, there is not enough information in the paper to perform this type of analysis.