Managing tooth decay situation in preschool children through community engagement, prevention and caries arrest treatment with silver diamine fluoride

Prof. ECM Lo

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Summary of the impact

- The HKU Faculty of Dentistry researchers have developed oral health programme to manage tooth decay in preschool children through community engagement, prevention and caries arrest treatment with silver diamine fluoride.

- Since 2010, more than 150,000 children (18,000 children/year) have benefitted from the programme.

- Direct health impact: reduction of children with tooth decay (from 43% in 2010 to 35% in 2016) and most (70%) of the treated caries become arrested.

- A new clinical guideline on using SDF was developed by the American Academy of Pediatric Dentistry in 2017.
Background and underpinning research

Findings of the Hong Kong Oral Health Survey 2011:
• Half of the 5-year-old children suffered from tooth decay.
• Over 90% of their decayed teeth were left untreated.
• 75% of them had never visited a dentist.
• No improvement compared to the previous survey in 2001.

(Department of Health, 2013)

This calls for action and strategy to improve the oral health of preschool children.
Innovativeness & knowledge exchange

• In the early 2000s, the HKU Faculty of Dentistry pioneered in conducting clinical research on silver diamine fluoride (SDF) (Lo et al. 2001, Chu et al. 2002, Tan et al. 2010)

• Based on the good results, SDF has been used for dental caries control in kindergarten children in Hong Kong (Zhi et al. 2012, Duangthip et al. 2016, Fung et al. 2017, Duangthip et al. 2017)
Significance of the research

SDF application is an effective alternative to fill and drill treatment of carious cavities.

Active caries lesions
(yellow or light brown)

Application of SDF
(non-invasive)

Arrested caries lesions
(dark brown or black)
Academic impacts

❖ SDF treatment for caries control has been recognized locally and internationally

❖ External grants
  • 2 Research Grants Council (GRF)
  • 1 Health Care and Promotion Fund
  • 1 S.K. Yee Medical Foundation
  • 1 Health and Health services Research Fund

❖ > 30 papers on promoting oral health in kindergarten children in scientific journals

❖ 3 prestigious international research excellent awards
Oral health programme in H.K. kindergartens in 2010-2018

1. Oral examination and arresting tooth decay with application of silver diamine fluoride (SDF) solution

2. Oral health education for children, parents and kindergarten teachers
Partnership and collaboration have been established with a dental product company and approximately 200 kindergartens organized by various NGOs.
Engagement
Impact achieved

Reaching a large number of children, parents and teachers
• around 200 kindergartens every year
• > 150,000 preschool children have benefitted from this program

Great improvement in the children’s oral health
• reduction in prevalence of caries (43% in 2010; 35% in 2016)
• high caries arrest rate (70%)
Engagement and impact achieved

>500 kindergarten teachers participated in oral health seminars and lectures during 2012-2017.
Engagement and impact achieved

Oral health education for children

Oral health education for parents
### Details of the impact

Reaching a large number of children, parents and teachers

<table>
<thead>
<tr>
<th>Summary of the impact</th>
<th>Total</th>
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<tbody>
<tr>
<td>Average no. of children examined/ year</td>
<td>18,000</td>
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<tr>
<td>Average no. of children received SDF/ year</td>
<td>5,800</td>
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<tr>
<td>Average no. decayed teeth treated with SDF/ year</td>
<td>23,500</td>
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<tr>
<td>Total no. of children received dental check-up and OHE</td>
<td>126,000</td>
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<tr>
<td>Total no. of children received OHE only</td>
<td>40,000</td>
</tr>
<tr>
<td>Total no. of children received SDF treatment</td>
<td>40,000</td>
</tr>
<tr>
<td>Total no. of decayed teeth treated with SDF</td>
<td>164,000</td>
</tr>
</tbody>
</table>

SDF = silver diamine fluoride  
OHE = oral health education and received free toothbrush and toothpaste
Impact achieved

Preventive effect: a significant reduction in proportion of kindergarten children with dental caries
Impact achieved

Treatment Effect

• High success rate - 70% of active caries become arrested after application of 38% SDF solution (Fung et al. 2017).

• 4,060 children/year saved from toothache and infection. (5,800 children with caries treated by SDF x 70% success rate)

• HK$8.2 million/year saving in oral health service (cost of a dental filling $500 x 23,500 SDF-treated teeth x 70%)
Programme evaluation

>80 % of parents accepted SDF treatment and gave consent for their children. <5% of the children were uncooperative during the treatment.

Questionnaires: response rates >80%

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<tbody>
<tr>
<td>Overall satisfaction</td>
<td>99%</td>
<td>99%</td>
<td>98%</td>
<td>98%</td>
<td>98%</td>
</tr>
<tr>
<td>The program was helpful in improving children’s oral health</td>
<td>96%</td>
<td>97%</td>
<td>97%</td>
<td>99%</td>
<td>95%</td>
</tr>
<tr>
<td>The program helped promoting oral health awareness</td>
<td>99%</td>
<td>93%</td>
<td>97%</td>
<td>98%</td>
<td>95%</td>
</tr>
</tbody>
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Focus group interviews with teachers:

“Since having dentist come to our school, the parents are more aware and do brush their child’s teeth with the given souvenir toothbrush, also ticked the brushing chart.”
Engagement and impact achieved

Mass media reported the oral health programme for preschool children and use of silver diamine fluoride to arrest tooth decay.
Engagement and impact achieved

Dental checks at nurseries prompt warning

About two out of five kindergarten children have cavities, with kids in Sham Shui Po, Wong Tai Sin and North District having the worst dental health in the territory, the University of Hong Kong has found.

HKU dentistry faculty’s outreach program conducted checkups on 23,000 kindergarten children during the 2014-15 academic year, finding each child had 1.5 decayed teeth on average.

The overall prevalence rate of dental cavities in young children is 37 percent in Hong Kong, which is double that of Japan. Prevalence rates in the United States are 23 percent and in Britain 28 percent.

However, the local rate has steadily decreased in the past two years, dropping from 44 percent in 2012-13 and 41 percent in 2013-14.

The number of decayed teeth on average has dropped from 1.6 to 1.5 per child.

Chair professor Edward Lo Chim-sun said conducting more checkups would increase awareness among parents about the importance of dental health.

“Some parents may have the misconception that primary teeth with dental cavities do not need treatment as they will soon fall off to be replaced by permanent teeth,” Lo said.

The data showed the prevalence rate of pre-schoolers with cavities was 45 percent in Sham Shui Po, 41 percent in Wong Tai Sin and 44 percent in North District.

“Families in these districts may have lower affordability and lower educational level to access dental services,” Lo said.

He estimated that more than 90 percent of preschoolers have never visited a dentist.
Impact on oral health policies and guidelines

- Based on our research findings, a clinical guideline on use of SDF was developed by the American Academy of Pediatric Dentistry in 2017.
- The basis of this new guideline comes mainly from our published research findings in a systematic review (JDR Clin Transl Res 2016;1:201-10).

SDF is considered as a breakthrough dental agent in treating tooth decay.
(Horst 2018)
Acknowledgement