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研究課題名(和文) Effects of school-based fluoride programs in Myanmar children

研究課題名(英文) Effects of school-based fluoride programs in Myanmar children

研究代表者

カウン ミヤットトゥイン (Kaung, Myat Thwin)

新潟大学・医歯学系・助教

研究者番号：40844353

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研究成果の概要(和文)：3か月おきにフッ化物バーニッシュを塗布すると、毎週1回フッ化物洗口を行うよりも優れた効果があることがわかりました。データは、高リスクの小児には頻繁なフッ化物バーニッシュ適用をより活用すべきであることを示唆しました。さらに、この研究は、虫歯の経験と口腔衛生状態が虫歯原性細菌によって影響を受けることを明らかにしました。

研究成果の学術的意義や社会的意義

From our results, we provided useful information about comparative effects in caries inactivation between FV application and FMR, and their anti-bacterial effects on cariogenic bacteria. Moreover, this study highlighted a better preventive strategy for school-based fluoride utilization in Myanmar.

研究成果の概要(英文)：We investigated the anti-carries effects of school-based Fluoride Varnish (FV) application with 3-month interval and Fluoride Mouth Rinsing (FMR) weekly on primary teeth and evaluated the anti-microbial effects of FV or FMR on cariogenic bacteria among Myanmar children. The application of FV over a 3-month interval was found to have a superior effect than weekly FMR. The data suggested that frequent FV application should be more utilized for high-risk children. Furthermore, this study revealed that caries experience and oral hygiene status was influenced by cariogenic bacteria. Therefore, it is important to diminish the amount of cariogenic bacteria and the degree of acid production from the perspective of caries prevention.

研究分野：Oral Health Promotion

キーワード：dental caries status fluoride varnish fluoride mouth rinse Myanmar schoolchildren

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1 . 研究開始当初の背景

The prevalence of dental caries has been declining among children and adolescents in developed countries; however, it still remains an epidemic and highly prevalent condition, especially among the underprivileged groups of developing countries. As Myanmar is one of the least developed countries in the world, dental caries is a serious public health problem in children there. As dental caries is an increasing burden in Myanmar children, prompt and adequate measures should be applied using evidence-based prevention-orientated methods.

Among the various methods to prevent the dental caries, topical application of fluoride varnish (FV) is a choice of fluoride for young children and has become the focus of attention because of its effectiveness, safety, and simplicity. On the other hand, fluoride mouth rinse (FMR) is also one of the preventive options, and FMR under supervision was frequently used in school-based programs. Although comparative studies of semi-annual FV application with FMR weekly have been performed, no scientific evidence in comparison with FV application at 3-month intervals and FMR weekly was available. Furthermore, to date, there are still not many studies on the effect of fluoride on cariogenic bacteria over a given period; thus, it could not reveal any conclusive results. In addition, no research on school-based fluoridated programs has been conducted in Myanmar yet.

2 . 研究の目的

The purpose of this study were to investigate the anti-caries effects of school-based FV application at 3-month intervals and FMR weekly on primary teeth and to evaluate the anti-microbial effects of FV or FMR on cariogenic bacteria among Myanmar children.

3 . 研究の方法

The participants of this study were 5-year-old children (grade 1) attending one of the three

primary schools in Yangon city, Myanmar, which were selected by the Department of Basic Education, Ministry of Education. A total of 234 school children with consent forms and complete fluoride applications included in the study. Figure 1 shows the flowchart of this 6-month-long interventional study.

All participating children were clinically examined for oral health status at baseline and during the 6-month follow-up. A dentist conducted all the clinical oral examinations, and an assistant helped record the data in their respective schools. Dentition and oral hygiene status were assessed using a dental mirror, a WHO-CPI probe, and a handheld light with a knee-to-knee

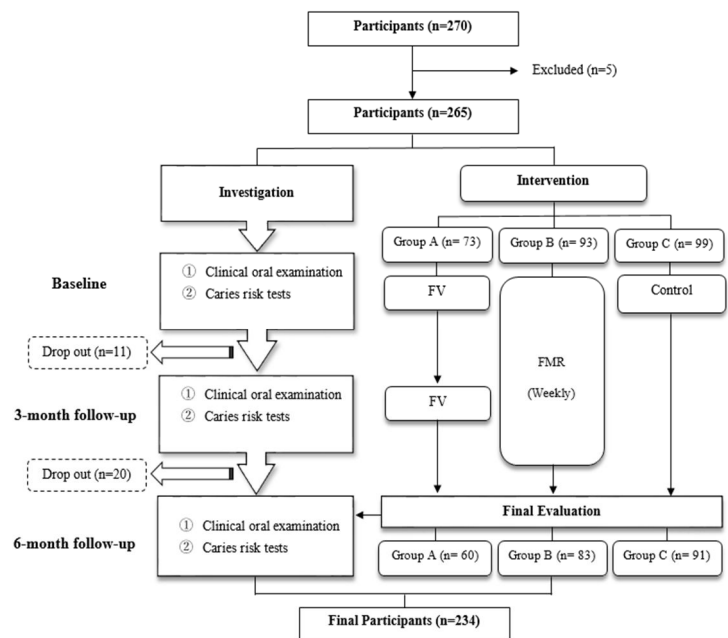


Fig. 1. Flowchart of study design

method. After oral examination, caries risk tests were performed by using Dentocult[®] SM (Oral Care Co. Ltd., Tokyo, Japan) and Cariostat[®] (DENTSPLY-Sankin K.K. Co. Ltd., Tokyo, Japan) at baseline and 6-month follow-up. With collaborative support from a microbiologist, the caries risk test vials were incubated at 37°C for 48 h, and scores ranging from 0 to 3 were evaluated according to the manufacturer's instruction. The score of plaque Dentocult[®] SM was calculated by adding the scores of four tooth surfaces and dividing the quotient by four. The children were divided into two groups (no change/increased score and decreased score) based on the changes in caries risk tests scores between baseline and the 6-month follow-up appointment.

Prior to fluoride applications, a toothbrush was given to each child, and they were asked to brush their teeth only with water. FV (5%, 22,600 ppmF) (Denu[®] clear varnish, South Korea) and FMR (0.2%, 900 ppmF) (Miranol[®], Japan) were used for the intervention in this study. After practicing the initial mouth rinsing with drinking water, children started FMR solution

using 10 ml of 0.2% NaF solution under the supervision of school teachers. The rinsing solution used in this study was prepared by dissolving 1 pack of FMR (1.8 g) with 100 ml of water in a plastic container to make a solution with a concentration of 0.2% NaF. Ten milliliters of the prepared solution was measured accurately into each paper cup at the school. A paper cup containing the prepared solution was given to each child, and then the children were asked to rinse vigorously for 1 min. The children from both groups avoided eating and drinking for one hour.

4 . 研究成果

Characteristics of the three groups at baseline

At the baseline, there were no significant differences in mean age, proportions of boys and girls, and numbers of present teeth between the three groups. No significant differences were found in caries prevalence, mean numbers of decayed primary tooth surfaces (ds), missing primary tooth surfaces (ms), filled primary tooth surfaces (fs), dmfs, debris score, and scores for Dentocult[®] SM and Cariostat[®] tests between the three groups at the baseline.

Comparison between baseline and the 6-month follow-up appointment

The prevalence of dental caries slightly increased from baseline to the 6-month follow-up appointment in all groups; however, the difference was not statistically significant (Table. 1). The differences in mean dmfs scores were not statistically significant in Group A and Group B at the 6-month follow-up appointment compared with the baseline. On the other hand, the mean dmfs score significantly increased from baseline to the 6-month follow-up appointment in Group C ($p = 0.001$). In Group A, the plaque and saliva scores of Dentocult[®] SM significantly decreased from baseline to the 6-month follow-up appointment. The Cariostat[®] score also decreased from baseline to the 6-month follow-up appointment although no significant difference was found ($p = 0.542$). In Group B, all caries risk scores decreased from baseline to the 6-month follow-up appointment, but no significant differences were observed. On the other

hand, the plaque and saliva scores of Dentocult® SM significantly increased during the 6 months of follow-up in Group C ($p = 0.001$ and $p = 0.014$). The Cariostat® score also increased from baseline to the 6-month follow-up appointment although the difference was not statistically significant ($p = 0.124$).

Table.1. Comparison between baseline and the 6-month follow-up appointment

	Group A, FV (n=60)			Group B, FMR (n=83)			Group C, Control (n=91)		
	Baseline	6-month	<i>p</i> -value	Baseline	6-month	<i>p</i> -value	Baseline	6-month	<i>p</i> -value
Caries prevalence	80.0%	84.0%	0.795	80.7%	84.0%	0.701	87.1%	95.1%	0.180
dmfs	12.83	14.82	0.061	11.60	14.47	0.052	12.53	17.08	0.001
Debris score	1.46	1.41	0.419	1.39	1.36	0.145	1.52	1.66	0.604
Dentocult® SM (Plaque)	0.92	0.80	0.049	0.86	0.76	0.178	0.95	1.20	0.001
Dentocult® SM (Saliva)	1.34	0.96	0.006	1.17	0.99	0.142	1.29	1.48	0.014
Cariostat®	1.26	1.24	0.542	1.17	1.05	0.645	1.25	1.40	0.124

Values are presented as mean except for caries prevalence (%).

Comparison of changes between the three groups

Less than half of the children in Group A and Group B (46.7% and 47.0%) developed carious lesions during the 6-month follow-up period and approximately two-thirds of the children (67.0%) developed carious lesions in Group C. The development of dental caries was significantly more in Group C than in Groups A and B at the 6-month follow-up appointment ($p = 0.010$). In addition, children in Group A and Group B had significantly improved plaque and saliva scores of Dentocult® SM compared to those in Group C ($p < 0.001$ and $p < 0.001$). On the other hand, the changes in the mean dmfs score, debris score, and Cariostat® score did not differ significantly between the three groups.

5. 主な発表論文等

〔雑誌論文〕 計2件（うち査読付論文 2件/うち国際共著 2件/うちオープンアクセス 1件）

1. 著者名 Kaung Myat Thwin, Wa Than Lin, Noboru Kaneko, Kaname Nohno, Hiroshi Ogawa	4. 巻 20
2. 論文標題 Anti-caries and Anti-microbial Effects of School-based Fluoride Programs in Myanmar Schoolchildren	5. 発行年 2022年
3. 雑誌名 Oral Health and Preventive Dentistry	6. 最初と最後の頁 165-172
掲載論文のDOI（デジタルオブジェクト識別子） 10.3290/j.ohpd.b2960285	査読の有無 有
オープンアクセス オープンアクセスとしている（また、その予定である）	国際共著 該当する

1. 著者名 Thwin Kaung Myat, Tun Tin Zar, Kaneko Noboru, Nohno Kaname, Ogawa Hiroshi	4. 巻 35
2. 論文標題 Clinical and Microbial Evaluation of Dental Caries Status and Associated Factors Among Primary Schoolchildren in Myanmar: A Cross-Sectional Study	5. 発行年 2022年
3. 雑誌名 Asia Pacific Journal of Public Health	6. 最初と最後の頁 42～49
掲載論文のDOI（デジタルオブジェクト識別子） 10.1177/10105395221139347	査読の有無 有
オープンアクセス オープンアクセスではない、又はオープンアクセスが困難	国際共著 該当する

〔学会発表〕 計5件（うち招待講演 3件/うち国際学会 3件）

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2. 発表標題 Anti-caries and anti-microbial effects of school-based fluoride programs in Myanmar
3. 学会等名 The 35th Annual Meeting of IADR (Southeast Asia Division) 2021 (国際学会)
4. 発表年 2021年

1. 発表者名 Kaung Myat Thwin
2. 発表標題 Global perspectives on caries prevention
3. 学会等名 Myanmar Dental Association Mid-Year Digital Conference (招待講演) (国際学会)
4. 発表年 2020年

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4. 発表年 2020年

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2. 発表標題 International Oral Health
3. 学会等名 Webinar event for undergraduate dental students in Myanmar (招待講演)
4. 発表年 2022年

1. 発表者名 Kaung Myat Thwin
2. 発表標題 Dental Caries in Myanmar: Current Status and Future Perspectives
3. 学会等名 Special Lecture for FPFA (Myanmar Section) (招待講演)
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〔図書〕 計0件

〔産業財産権〕

〔その他〕

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6. 研究組織

氏名 (ローマ字氏名) (研究者番号)	所属研究機関・部局・職 (機関番号)	備考
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7. 科研費を使用して開催した国際研究集会

〔国際研究集会〕 計0件

8 . 本研究に関連して実施した国際共同研究の実施状況

共同研究相手国	相手方研究機関
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