Level of Knowledge about "Spit Don't Rinse" Brushing Technique and Influencing Factors among Dental Patients in Vajira Hospital

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Abstract

Objective: This work surveyed the level of knowledge about the "spit don't rinse" brushing technique and studied the influencing factors among dental patients in Vajira Hospital.

Methods: A cross-sectional survey was conducted on 385 dental patients in Vajira Hospital from September to November 2021. The level of knowledge of the "spit don't rinse" brushing technique and the influencing factors were collected using an online questionnaire created by the researchers. Frequency, percentage, mean, and standard deviation were calculated, and the level of knowledge was compared among the different groups by chi-square test. Multiple logistic regression analysis was used to analyze the relationship between the influencing factors and level of knowledge.

Results: The overall mean knowledge score was 5.3 ± 2.73. Approximately 76.6% of the dental patients had a low level of knowledge about the "spit don't rinse" brushing technique. Comparison revealed that sex, age, education, occupation, and experience of learning had a statistically significant influence on the level of knowledge. Multiple logistic regression analysis revealed that the following two factors were correlated with moderate/high level of knowledge about the "spit don't rinse" brushing technique: higher education (adjusted OR = 8.87, 95%CI: 1.66–46.40, p-value = 0.011) and experience of learning (adjusted OR = 3.56, 95%CI: 1.22–10.37, p-value = 0.020).

Conclusion: The dental patients treated in Vajira Hospital do not understand and follow the correct procedures of the "spit don't rinse" brushing technique. Dental practitioners should effectively provide knowledge on this practice to prevent dental caries, promote oral health, and reduce the prevalence of dental caries.

Keywords: spit don't rinse, knowledge, dental patient

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การศึกษาระดับความรู้เกี่ยวกับการแปรงแห้งและปัจจัยที่มีผลต่อความเข้าใจวิธีการแปรงแห้งของผู้รับบริการทางทันตกรรมในโรงพยาบาลวชิรพยาบาล

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บทคัดย่อ

วัตถุประสงค์: เพื่อสำรวจระดับความรู้เกี่ยวกับการแปรงแห้ง และศึกษาปัจจัยที่มีผลต่อความเข้าใจวิธีการแปรงแห้งของผู้รับบริการทางทันตกรรมในโรงพยาบาลวชิรพยาบาล

วิธีการดำเนินการวิจัย: การศึกษาเชิงสำรวจแบบภาคตัดขวางในผู้รับบริการทางทันตกรรมในโรงพยาบาลวชิรพยาบาล 385 คน ในช่วงระหว่างเดือนกันยายน-พฤศจิกายน 2564 เก็บข้อมูลระดับความรู้เกี่ยวกับการแปรงแห้ง และปัจจัยทางสังคม โดยใช้แบบสอบถามออนไลน์ที่ผู้วิจัยสร้างขึ้น วิเคราะห์ข้อมูลโดยความถี่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และเปรียบเทียบความแตกต่างของระดับความรู้เกี่ยวกับการแปรงแห้งระหว่างกลุ่มตัวอย่างโดยใช้การทดสอบไคสแควร์ วิเคราะห์ความสัมพันธ์แบบหลายตัวแปร ระหว่างปัจจัยต่างๆ กับระดับความรู้เกี่ยวกับการแปรงแห้ง โดยใช้การวิเคราะห์ความถดถอยพหุโลจิสติก

ผลการวิจัย: การประเมินระดับความรู้เกี่ยวกับการแปรงแห้ง พบว่ามีคะแนนเฉลี่ย 5.3 ± 2.73 คะแนน และผู้รับบริการทางทันตกรรมร้อยละ 76.6 มีระดับความรู้ต่ำ การเปรียบเทียบระดับความรู้เกี่ยวกับการแปรงแห้งของผู้รับบริการทางทันตกรรม พบว่า เพศ อายุ ระดับการศึกษา อาชีพ และประสบการณ์การรับทราบเกี่ยวกับการแปรงแห้งมีความแตกต่างอย่างมีนัยสำคัญทางสถิติ และเมื่อนำมาวิเคราะห์ความสัมพันธ์แบบหลายตัวแปรโดยใช้การวิเคราะห์ความถดถอยพหุโลจิสติก พบว่าปัจจัยที่มีความสัมพันธ์กับระดับความรู้เกี่ยวกับการแปรงแห้งของผู้รับบริการทางทันตกรรมในระดับปานกลาง/สูงอย่างมีนัยสำคัญ ได้แก่ ผู้รับบริการทางทันตกรรมที่มีระดับการศึกษาสูงกว่าปริญญาตรีมีความรู้เกี่ยวกับการแปรงแห้งมากกว่าผู้มีระดับการศึกษาต่ำกว่ามัธยมปลาย (adjusted OR = 8.87, 95%CI: 1.66–46.40, p-value = 0.011) และผู้รับบริการทางทันตกรรมที่เคยมีประสบการณ์การรับทราบเกี่ยวกับการแปรงแห้งมีความรู้เกี่ยวกับการแปรงแห้งมากกว่าผู้ที่ไม่เคยมีประสบการณ์การรับทราบเกี่ยวกับการแปรงแห้ง (adjusted OR = 3.56, 95%CI: 1.22–10.37, p-value = 0.020)

สรุป: ผู้รับบริการทางทันตกรรมในโรงพยาบาลวชิรพยาบาลส่วนมากยังไม่มีความเข้าใจวิธีการแปรงแห้งที่ถูกต้อง ทันตบุคลากรควรให้ความรู้เกี่ยวกับวิธีการแปรงแห้งแก่ผู้รับบริการทางทันตกรรม หรือประชาชนทั่วไป เพื่อให้มีประสิทธิภาพในการป้องกันฟันผุ และเป็นการส่งเสริมสุขภาพช่องปาก ส่งผลให้ความชุกของโรคฟันผุลดลง

คำสำคัญ: แปรงแห้ง ความรู้ ผู้รับบริการทางทันตกรรม

วันที่รับบทความ 27 กรกฎาคม 2565 **วันแก้ไขบทความ** 11 ตุลาคม 2565 **วันตอบรับบทความ** 21 ตุลาคม 2565

Introduction

According to 8th Thailand National Oral Health Survey (2017) by the Bureau of Dental Health, the prevalence of dental caries in Bangkok was 51.3%, 93.2%, and 98.7% among 15-year-old adolescent, 35- to 44-year-old, and 60- to 74-year-old populations, respectively[1]. These data suggested that dental caries are one of the most important problems among the Bangkok population.

Fluorides are efficiently used for the prevention of dental caries and are widely available in many forms, such as fluoride toothpaste, fluoride mouthwash, and professional fluoride. Among which, fluoride toothpaste is the most commonly available[2]. A systematic review found that fluoride toothpaste helps reduce dental caries[3,4]. As soon as the first primary tooth erupts, fluoride toothpaste is recommended for use to prevent dental caries[5].

One of the reasons why the Bangkok population still has a high prevalence of dental caries is that not all available toothpaste products on the market contain fluoride. The 8th Thailand National Oral Health Survey (2017) showed that fluoride toothpaste is being used by 80.7%, 84.1%, and 80.0% of the Bangkok population aged 15 years, 35–44 years, and 60–74 years, respectively[1]. Even though most of the population in Bangkok use fluoride toothpaste, the prevalence of dental caries is still high. This phenomenon is conflicting with the preventative function of fluoride against dental caries. A previous study showed that rinsing with water after brushing could increase the fluoride clearance rate in saliva. Compared with that in no rinsing, fluoride concentration in saliva was reduced by 1–2 times in single postbrushing water rinse and by 4–5 times in double postbrushing water rinse. Therefore, the dental caries-preventing effect of fluoride might be reduced after rinsing with water[6]. Several studies also found and supported that rinsing with water after brushing is associated with dental caries compared with nonrinsing with water after brushing[7-11]. Although the majority of the population uses fluoride toothpaste, dental caries cannot be prevented because the fluoride concentration in saliva decreases due to rinsing with water after brushing.

"Spit don't rinse" is the technique that involves the usual fluoride toothpaste and brushing technique for at least twice daily but emphasizes nonrinsing. In 2012, Pitts et al.[12] recommended the "spit don't rinse" brushing technique (rinsing with the slurry of fluoride toothpaste and saliva to avoid rinsing with water) to increase postbrushing fluoride retention and prevent dental caries. This approach was also recommended by FDI World Dental Federation in 2015[2] and was recognized among Thai dental professionals in 2017, Krisdapong[13] explained that the "spit don't rinse" brushing technique is spitting without rinsing with water or any mouthwash. After brushing, a person must spit with a slurry of toothpaste and brush lightly on the base to apex of tongue for 2–3 times to get rid of the slurry of toothpaste and spit it out. Continuously spit until you feel comfortable. If rinsing with water is necessary, then use 1–2 teaspoons or 5–10 mL of water and gargle before spitting. This amount of water is the minimum level to maintain the high fluoride concentration in saliva.

Information on the "spit don't rinse" brushing technique is extensively available on a wide variety of media platforms. Nevertheless, whether the dental patients who received this information will understand and follow the correct procedures is unclear. In addition, the factors affecting the ability of these patients to achieve a high level of understanding, which will consequently translate to the prevention of dental caries, remains unknown.

Therefore, our study aimed to survey the level of knowledge about the "spit don't rinse" brushing technique and determine the influencing factors among dental patients in Vajira Hospital.

Methods

After receiving the approval of our Institutional Review Board, we performed a cross-sectional survey on the level of knowledge about the "spit don't rinse" brushing technique among dental patients in Vajira Hospital. Sample size of 385 was estimated from a proportion of an infinite population by the formula:[14]

$$n = \frac{Z_{\alpha/2}^2\, p(1 - p)}{d^2}$$

in which the acceptable margin of error of 5%, confidence level of 95% and estimating proportion of 50%.

Inclusion criteria were as follows: dental patients in Vajira Hospital aged 18 years or above and consented to the online questionnaire survey. Exclusion criteria were as follows: dental patients who are not able to read, do not have a smartphone, and already answered the online questionnaires and dental practitioners.

The online assessment questionnaire on "spit don't rinse" brushing technique knowledge was designed by the researcher on the basis of a literature review. The questionnaire consisted of two parts. The first part included factors such as sex, age, education, occupation, and experience learning about "spit don't rinse" brushing technique. The second part included 12 knowledge questions with one correct answer to assess the level of knowledge; correct answers were scored 1, and wrong or unsure answers were scored 0. The level of knowledge was categorized as high (more than 80% or 10–12 points), moderate (60%–79% or 8–9 points), and low (less than 60% or 0–7 points)[15].

The content validity of the questionnaire was calibrated by three specialists using the index of item objective congruence (IOC) with Rovinelli and Hambleton formula[16] and the obtained IOC was 1. The reliability of the questionnaire was determined by conducting a pilot study on 30 dental patients in Vajira Hospital who were not included in the sample group. The reliability of the questionnaire was assessed using Cronbach's alpha coefficient[17] and the obtained value was 0.72.

Descriptive statistics was used to analyze the influencing factors and level of knowledge about the "spit don't rinse" brushing technique. Chi-square test was applied to examine and compare the level of knowledge among different groups. Multiple logistic regression analysis was adopted to study the relationship between the influencing factors and level of knowledge. The level of significance was set at 0.05. All data were analyzed using statistical software SPSS version 28.

Results

A total of 385 the participants were included in this study. The age ranged between 18 and 77 years, with most aged less than 40 years (49.1%). Most of the participants were females (63.4%), government official/state enterprise employees (36.9%), bachelor degree holder (54.4%) as shown in Table 1.

Only 23.4% participants had experience learning about the "spit don't rinse" brushing technique. Most of them learned from social media platforms (website, Facebook, and Line) (15.1%), dental practitioners (6.8%), television media (6.0%), and newspaper/magazine media (1.3%).

The mean score of knowledge was 5.3 ± 2.73. Most participants had a low level of knowledge about the "spit don't rinse" brushing technique (76.6%) as shown in Table 2. Almost 80% participants had answered correctly on the question of "prebrushing water rinse to get rid of food particles." The participants showed extremely low correct responses for the following questions: adequate brushing requires at least 1 minute (21.3%); after brushing, one can eat or drink immediately (25.2%); "spit don't rinse" can reduce dental caries compared with usual brushing (33.8%); after brushing, spit with a slurry of toothpaste and saliva until you feel comfortable without water rinsing (34.5%); and soaking the toothbrush before squeezing the toothpaste, and the toothpaste slurry helps clean the teeth (36.6%).

The association between the influencing factors and level of knowledge about the "spit don't rinse" brushing technique is presented in Table 3. Comparison showed that the level of knowledge about the "spit don't rinse" brushing technique showed statistically significant (p-value < 0.05) difference among the individuals of varying sex, age, education, occupation, and experience of learning. Logistic regression was then adopted to explore the factors influencing the moderate/high level of knowledge about the "spit don't rinse" brushing technique.

Table 1:
The factors of the study participants

Factors	Frequency	Percentage
Age (Years)		
Less than 40	189	(49.1)
40 - 59	122	(31.7)
More than 60	74	(19.2)
Sex		
Female	244	(63.4)
Male	141	(36.6)
Education		
Lower than high school	35	(9.1)
High school/Vocational Certificate	52	(13.5)
Diploma/High vocational Certificate	21	(5.5)
Bachelor	221	(57.4)
Higher bachelor	56	(14.5)
Occupation		
Government official/State enterprise employee	142	(36.9)
Student	58	(15.1)
Company employee	57	(14.8)
Jobless	43	(11.2)
Shopkeeper/Self employed	31	(8.1)
Retired government official	28	(7.3)
Employee/Freelance	26	(6.8)
Experience learning about the level of knowledge about “spit don’t rinse” brushing technique		
No	295	(76.6)
Yes	90	(23.4)
Social media platforms (website, Facebook, Line)	58	(15.1)
Dental practitioners	26	(6.8)
Television	23	(6.0)
Newspaper/Magazine	5	(1.3)
Radio	0	(0.0)
Other	5	(1.3)

Table 2:
The level of knowledge about “spit don’t rinse” brushing technique of the study participants

The level of knowledge	Frequency	Percentage
Low level	295	(76.6)
Moderate level	62	(16.1)
High level	28	(7.3)

Table 3:

Comparison of the level of knowledge about "spit don't rinse" brushing technique between different groups

Factors	Level of knowledge				p-value
	Low (n = 295)		Moderate/ High (n = 90)		
	frequency	Percentage	frequency	Percentage	
Age (Years)					
Less than 40	132	(44.7)	57	(63.3)	0.006*
40 - 59	104	(35.3)	18	(20.0)	
More than 60	59	(20.0)	15	(16.7)	
Sex					
Female	179	(60.7)	65	(72.2)	0.047*
Male	116	(39.3)	25	(27.8)	
Education					
Lower than high school	33	(11.2)	2	(2.2)	0.031*
High school/Vocational Certificate	39	(13.2)	13	(14.4)	
Diploma/High Vocational Certificate	18	(6.1)	3	(3.3)	
Bachelor	168	(56.9)	53	(58.9)	
Higher bachelor	37	(12.5)	19	(21.1)	
Occupation					
Working	206	(69.8)	50	(55.6)	0.001*
Jobless	56	(19.0)	15	(16.7)	
Student	33	(11.2)	25	(27.8)	
Experience learning about the level of knowledge about "spit don't rinse" brushing technique					
No	253	(85.8)	42	(46.7)	<0.001*
Yes	42	(14.2)	48	(53.3)	
Television	15	(5.1)	8	(8.9)	0.183
Newspaper/Magazine	3	(1.0)	2	(2.2)	0.333
Social media platforms (website, Facebook, Line)	25	(8.5)	33	(36.7)	<0.001*
Dental practitioners	10	(3.4)	16	(17.8)	<0.001*
Other	2	(0.7)	3	(3.3)	0.086

* statistically significant difference at 0.05 level

The results of univariable analyses are presented in Table 4. The factors identified in univariable analysis were incorporated into multivariable analysis. Multiple logistic regression analysis (Table 4) revealed that the following factors were correlated with moderate/high level of knowledge about the "spit don't rinse" brushing technique: higher education (adjusted OR = 8.87, 95%CI: 1.66–46.40, p-value = 0.011) and experience learning (adjusted OR = 3.56, 95%CI: 1.22–10.37, p-value = 0.020).

Table 4:

Logistic regression for relationship of factors with the level of knowledge about "spit don't rinse" brushing technique

Factors	Univariable analysis			Multivariable analysis		
	OR[1]	95%CI	p-value	OR_{adj} [2]	95%CI	p-value
Age (Years)						
Less than 40	1.00	Reference		1.00	Reference	
40 - 59	0.40	(0.22 - 0.72)	0.002*	0.54	(0.27 - 1.10)	0.089
More than 60	0.59	(0.31 - 1.12)	0.108	0.58	(0.22 - 1.53)	0.269
Sex						
Female	1.69	(1.01 - 2.83)	0.048*	0.72	(0.40 - 1.30)	0.275
Male	1.00	Reference		1.00	Reference	
Education						
Lower than high school	1.00	Reference		1.00	Reference	
High school/ Vocational Certificate	5.50	(1.16 - 26.15)	0.032*	4.94	(0.93 - 26.32)	0.061
Diploma/ High vocational Certificate	2.75	(0.42 - 18.01)	0.291	2.34	(0.31 - 17.64)	0.411
Bachelor	5.21	(1.21 - 22.42)	0.027*	3.21	(0.66 - 15.76)	0.150
Higher bachelor	8.47	(1.83 - 39.16)	0.006*	8.78	(1.66 - 46.40)	0.011*
Occupation						
Working	1.00	Reference		1.00	Reference	
Jobless	1.10	(0.58 - 2.11)	0.766	1.37	(0.54 - 3.44)	0.505
Student	3.12	(1.71 - 5.71)	<0.001*	2.01	(0.92 - 4.37)	0.079
Experience learning about the level of knowledge about "spit don't rinse" brushing technique						
No	1.00	Reference		1.00	Reference	
Yes	6.88	(4.06 - 11.67)	<0.001*	3.56	(1.22 - 10.37)	0.020*
Social media platforms (website, Facebook, Line)	6.25	(3.46 - 11.31)	<0.001*	1.65	(0.56 - 4.86)	0.368
Dental practitioners	6.16	(2.69 - 14.14)	<0.001*	2.35	(0.73 - 7.54)	0.150

Abbreviations: OR, Odds Ratio; OR_{adj}, Adjusted Odds Ratio; CI, confident interval.

Variable was included in multivariable model due to have p-value < 0.050 in univariable analysis.

[1] Crude Odds Ratio estimated by Binary Logistic regression.

[2] Adjusted Odds Ratio estimated by Multiple Logistic regression.

* statistically significant difference at 0.05 level

Discussion

Dental caries can be prevented by brushing with fluoride toothpaste. "Spit don't rinse" brushing technique is recommended to increase the effectiveness of dental caries prevention. In this study, we found that most dental patients in Vajira Hospital have a low level of knowledge about this practice. Only 21.3% of the dental patients in our study are aware that at least 1 minute is required for adequate tooth brushing. Most dental patients could not correctly answer this question. The lack of understanding on this topic may contribute to the high prevalence of dental caries in Bangkok. According to Zero et al. (2012)[18], the recommended brushing for at least 2 minutes increases the contact time between fluoride and tooth.

The questionnaire survey revealed that the dental patients do not have the following knowledge about the "spit don't rinse" brushing technique: 1. after brushing, one can eat or drink immediately; 2. "spit don't rinse" can reduce dental caries compared with usual brushing; 3. after brushing, spit with a slurry of toothpaste and saliva until you feel comfortable without water rinsing; and 4. Soaking the toothbrush before squeezing the toothpaste, and toothpaste slurry helps clean the teeth. These questions cannot be answered correctly by most dental patients. Therefore, the dental patients lack understanding of the "spit don't rinse" brushing technique. These findings suggested the inadequacy of public education on correct brushing techniques, especially "spit don't rinse."

In this study, we found that most of the dental patients have no experience learning about the "spit don't rinse" brushing technique. For those who have experience learning, the majority learned from social media platforms (website, Facebook, and Line). Other available sources of information include dental practitioners and television media. By contrast, the 8th Thailand National Oral Health Survey 2017 reported that the 35- to 44-year-old population in Bangkok acknowledges oral health information mainly from health workers. Television media and websites act as second and third sources of information[1]. These findings can guide public health authority to focus on effective channels for introducing promotional health programs such as "spit don't rinse" brushing technique to prevent dental caries.

Comparison revealed that the influencing factors, including sex, age, education, occupation, and experience of learning about "spit don't rinse" brushing technique, had a statistically significant difference among the level of knowledge groups at p-value < 0.05. This result confirmed Elrashid et al. 's findings that sociodemographic factors such as sex, age, education, and occupation affect the oral health knowledge (knowledge on dentition, brushing, dental hard tissue disease, gingival disease, and fluoride) of residents in Riyadh City, Kingdom of Saudi Arabia[19]. Furthermore, multiple logistic regression analysis identified the following two factors that are related to the moderate/high level of knowledge about "spit don't rinse" brushing technique (p-value < 0.05): higher education and experience of learning. We hypothesize that people who have higher education tend to have a high level of knowledge on this approach because they have many opportunities to access the knowledge either from social media platforms or self-learning search engines.

This study has some limitations. There is a dearth of oral health status information among dental patients. Therefore, even the people who have a high level of knowledge but do not represent the oral health status. Further studies are required on the relationship between the level of knowledge and oral health status.

"Spit don't rinse" brushing technique is a cheap, simple, and effective modality to prevent dental caries. Public health authority should promote this practice by introducing its concept and providing accessible information through different media platforms, such as social media platforms, television/radio programs, and newspaper/magazine. At the operational level, dental practitioners should effectively provide knowledge on this technique to prevent dental caries and promote oral health, which will reduce the prevalence of dental caries in Bangkok. Follow-up should be conducted on the people who use the "spit don't rinse" brushing technique to determine whether it can reduce the prevalence of dental caries.

Conclusion

Most dental patients in Vajira Hospital have a low level of knowledge and no experience learning about the "spit don't rinse" brushing technique. They do not understand or follow the correct procedures of this approach. Experience learning is one of the factors affecting the moderate/high level of knowledge on this practice. Dental practitioners should inform and suggest this technique to dental patients. Public health authorities should promote this concept and provide information through social media platforms and television/radio programs. The wide recommendation of "spit don't rinse" brushing technique could reduce the incidence of dental caries.

Conflict of interest

The authors declare no conflict of interest.

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References

1. Thailand BoDH. Report on the eighth national oral health survey of Thailand 2017. Nonthaburi: Department of Health, Ministry of Public Health; 2018.
2. FDI World Dental Federation. The challenge of oral disease – a call for global action. The oral health atlas. Geneva: FDI world Dental Federation; 2015.
3. Marinho VC, Higgins JP, Sheiham A, Logan S. Fluoride toothpastes for preventing dental caries in children and adolescents. Cochrane Database Syst Rev 2003(1):CD002278.
4. Walsh T, Worthington HV, Glenny AM, Marinho VC, Jeroncic A. Fluoride toothpastes of different concentrations for preventing dental caries. Cochrane Database Syst Rev 2019;3: CD007868.
5. Department of Health, NHS, BASCD. Delivering better oral health: an evidence-based toolkit for prevention. London: Public Health England; 2014.
6. Sjogren K, Birkhed D. Effect of various post-brushing activities on salivary fluoride concentration after toothbrushing with a sodium fluoride dentifrice. Caries Res 1994;28(2): 127-31.
7. Ashley PF, Attrill DC, Ellwood RP, Worthington HV, Davies RM. Toothbrushing habits and caries experience. Caries Res 1999;33(5):401-2.
8. Chesters RK, Huntington E, Burchell CK, Stephen KW. Effect of oral care habits on caries in adolescents. Caries Res 1992;26(4):299-304.
9. Chestnutt IG, Schafer F, Jacobson AP, Stephen KW. The influence of toothbrushing frequency and post-brushing rinsing on caries experience in a caries clinical trial. Community Dent Oral Epidemiol 1998;26(6):406-11.
10. Machiulskiene V, Richards A, Nyvad B, Baelum V. Prospective study of the effect of post-brushing rinsing behaviour on dental caries. Caries Res 2002;36(5):301-7.
11. O'Mullane DM, Kavanagh D, Ellwood RP, Chesters RK, Schafer F, Huntington E, et al. A three-year clinical trial of a combination of trimetaphosphate and sodium fluoride in silica toothpastes. J Dent Res 1997;76(11):1776-81.
12. Pitts N, Duckworth RM, Marsh P, Mutti B, Parnell C, Zero D. Post-brushing rinsing for the control of dental caries: exploration of the available evidence to establish what advice we should give our patients. Br Dent J 2012; 212(7):315-20.
13. Krisdapong S. Split don't rinse. Journal of Health Science 2017;26:348-59.
14. Daniel WW. Biostatistics: a foundation for analysis in the health sciences. 6th ed. New York: Wiley; 1995. p.780.
15. Bloom BS, Hastings JT, Madaus GF. Handbook on formative and summative evaluation of student learning. New York: McGraw-Hill; 1971. p.923.

16. Rovinelli RJ, Hambleton RK. On the use of content specialists in the assessment of criterion-referenced test item validity. Dutch Journal of Educational Research 1977;2: 49-60.
17. Cronbach LJ. Coefficient alpha and the Internal structure of tests. Psychometrika 1951;16: 297-334.
18. Zero DT, Marinho VC, Phantumvanit P. Effective use of self-care fluoride administration in Asia. Adv Dent Res 2012;24(1):16-21.
19. Elrashid AH, Al-Kadi RK, Baseer MA, Rahman GS, Alsaffan AD, Uppin RB. Correlation of sociodemographic factors and oral health knowledge among residents in Riyadh city. J Oral Health Comm Dent 2018;12(1):8-13.