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Original Article

The pattern of use of toothpaste among family members in Tehran Iran

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Abstract

Introduction: Oral health can influence general health and then the quality of life. Regular toothbrushing with toothpaste plays a fundamental role in oral hygiene. The aim of this study was to assess the pattern of utilization of toothpaste among Iranian population.

Materials & Methods: This cross-sectional study evaluated the family members of patients (n=715) presenting to dental clinics of School of Dentistry of Tehran University of Medical Sciences, in 2017. A researcher-made questionnaire was used to collect information regarding the pattern of utilization of toothpaste by the subjects. Data were analyzed using Chi-square test via SPSS 25.

Results: Of all, 81% participants reported that they personally use toothpaste when toothbrushing and 75.9% stated that all the family members used toothpaste when brushing their teeth. Moreover, 57.2% reported that all the family members shared the same toothpaste; 86.6% reported that they started brushing the teeth of their children at the age of 3 years. When asked about the factors considered when for purchasing - toothpaste, the most important factors were the manufacturing country (42.5%), date of production (38.7%), having standard and authenticity labels (29.5%), the price (29.5%).

Conclusion: According to the results, Iranian families have inadequate knowledge about the correct pattern of use of toothpastes.

Keywords: Toothpastes, Family, Oral health, Iran

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الگوی استفاده از خمیر دندان افراد خانواده در تهران

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چکیده

مقدمه: سلامت دهان بر روی سلامت عمومی بدن و در نتیجه برکیفیت زندگی تاثیرگذار است. مسواک زدن به طور منظم همراه با خمیردندان نقش اساسی بر بهداشت دهان و دندان دارد. هدف این مطالعه بررسی الگوی استفاده از خمیردندان در جمعیت ایرانی می‌باشد.

مواد و روش ها: این مطالعه‌ی مقطعی، در بیماران مراجعه کننده (n=715) به دانشکده ی دندانپزشکی علوم پزشکی تهران در سال ۱۳۹۶ انجام شده است. پرسشنامه‌ی محقق ساخته برای جمع آوری اطلاعات در مورد الگوی استفاده از خمیردندان در افراد مورد مطالعه، مورد استفاده قرار گرفت. داده‌ها توسط نرم افزار SPSS 25 و آزمون Chi-Square آنالیز شدند.

یافته ها: ۸۱ در صد افراد گزارش کردند که شخصا هنگام مسواک زدن از خمیردندان استفاده می‌کردند. ٪۷۵/۹ از این افراد بیان کردند تمام اعضای خانواده از خمیردندان به همراه مسواک زدن استفاده می‌کردند و همینطور ٪۵۷/۲ گزارش کردند که تمام اعضای خانواده از یک خمیردندان مشترک استفاده می‌کردند. ٪۸۶/۶ خانواده ها مسواک زدن فرزندانشان را از سن ۳ سالگی آغاز کرده بودند. در رابطه با نکات مورد توجه هنگام خرید خمیردندان در بین مراجعین، مهم ترین موارد به این صورت بود که: ٪۴۲/۵ «ایرانی یا خارجی بودن»، ٪۳۸/۷ «تاریخ تولید و مصرف»، ٪۳۷/۱» استاندارد و تأییدهای آن»، ٪۲۹/۵ «قیمت»،انتخاب شده بودند.

نتیجه گیری: با توجه به نتایج مطالعه انجام شده، اطلاعات افراد در رابطه با الگوی صحیح مصرف خمیردندان در خانواده‌ها کافی نمی‌باشد.

واژگان کلیدی: خمیر دندان، خانواده،سلامت دهان، ایران

Introduction

Oral and dental health is a multi-dimensional phenomenon, which affects the correct speech, smile esthetics, smell, mastication as well as deglutition, and impacts on facial attractiveness and more importantly, systemic health. [1, 2] Mechanical plaque removal by toothbrushing with a toothpaste is the most commonly used technique for dental plaque removal and oral hygiene maintenance. [3] In this respect, toothpaste is the most commonly used oral hygiene product. [3,4] "Dentifrice" is a general term composed of "dent" meaning tooth and "frice" meaning abrasion and wear. Toothpaste refers to dentifrices with a paste-like consistency. [5-7] Dentifrices are divided into six groups of toothpastes, tooth powders, moist tooth powders, tooth gels, a combination of toothpaste and gel and fluid-form toothpastes in terms of consistency. In terms of function, dentifrices can be divided into three groups of therapeutic, cosmetic and therapeutic-cosmetic toothpastes. Evidence shows that toothpastes containing sodium fluoride have greater cariostatic property than toothpastes containing sodium monofluorophosphate. [5,8,9] Evaluation of the behavior of consumers includes assessment of the products they buy, reason of purchase, time of purchase and frequency of purchase. Several factors affect the consumers' decision with regard to buying a toothpaste including recommendation by others, price, characteristics of the product, brand of product, advertisements, taste of toothpaste and

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promotions provided by the manufacturer (e.g. discount, gift, etc.). The effect of these factors is variable on different consumers. [4,8] The pattern of consumption of toothpastes highly varies in different countries and should be studied separately in different populations. The use of fluoridated toothpaste has been advised as a source of fluoride intake. Toothbrushing with fluoridated toothpaste has been suggested twice a day to prevent the caries and control the plaque. The WHO has announced that one tube of toothpaste every two months and a new toothbrush every 3 months should be observed. [9] In addition, the pattern of consumption of toothpaste, its method of application on toothpaste (smear, pea size, half load, full load), complete or partial coverage of bristles with toothpaste, type of toothpaste used and technique of toothbrushing (Bass, modified Bass, Roll, modified Stillman and Charter) can affect the plaque removal efficacy of toothpastes. [10-12] No studies have been conducted to evaluate meticulously the consumption pattern of toothpaste among Iranian population in Teharan. Considering all the above, this study aimed to assess the pattern of utilization of toothpaste in an Iranian population.

Materials &Methods

This study was approved by Ethical Committee of Tehran University of Medical Sciences (IR.TUMS.DENTISTRY.REC.1396.2996). This cross-sectional study evaluated the family members of 715 patients presenting to dental clinics of School of Dentistry of Tehran University of Medical Sciences and International Campus in 2017. We did not distribute our questionnaire to all waiting people. The subjects were randomly selected among those presenting to university dental clinics (in the waiting rooms) and their written informed consent was obtained. Since there was no similar previous study, sample size was calculated based on a pilot study. Considering the results of a pilot study conducted on 38 patients, minimum sample size was calculated to be 715 using the confidence interval for one proportion feature of PASS 11 software and assuming alpha=0.05, beta=0.2 and confidence interval of 0.06.

A researcher-made questionnaire was used for data collection. This questionnaire was designed based on the questions of previously used relevant questionnaires. The validity of the questionnaire was confirmed by assessing its content validity by the opinion of the experts, and its reliability was ensured by test-retest reliability and calculation of Cronbach's alpha (0.86). The questionnaires were distributed among subjects. The questionnaires were filled out anonymously and the subjects were ensured about the confidentiality of their information. Data were analyzed using SPSS 25 (SPSS Inc., IL, USA). The mean and standard deviation values were calculated and tabulated using descriptive statistics. The Chi-square test was used to compare the "duration of toothbrushing" and "use of dental floss and mouthwash", "frequency of rinsing the mouth after toothbrushing with toothpaste" and the "amount of consumed toothpaste", and the "amount of consumed toothpaste" with "duration of toothbrushing".

Results

Table 1 shows the 94.4% participants and 75.9% family members used toothpaste, 34.4% used only Iranian-made toothpaste, 33% used conventional type of toothpaste, 57.2% used shared toothpaste with their family members, 53.5% used pea-size toothpaste, 18.2% had more than 2 minutes toothbrushing duration time, 57.2% used toothpaste after three years olds, and 18.8% rinse mouth once after toothbrushing. Table 1 presents the questions in the questionnaire and the frequency of answers. Table 2 indicates the correlation of "duration of toothbrushing" with the "use of mouthwash and dental floss on a daily basis". The Chi-square test revealed a significant correlation between the aforementioned two variables ($P<0.001$). Moreover, a linear correlation was found between them (L value=0.02), indicating that the frequency of using both dental floss and mouthwash enhanced by increasing the duration of toothbrushing. Besides, by a reduction in duration of toothbrushing <2 minutes, the use of dental floss and mouthwash decreased. Table 3 illustrates the correlation of the "amount of toothpaste used for each time of toothbrushing" with "frequency of rinsing the mouth after toothbrushing with toothpaste". According to the Chi-square test, a significant correlation was noted between the "frequency of rinsing the mouth after using the toothpaste" and the "amount of toothpaste used for each time of toothbrushing" ($P<0.001$). These two variables were correlated but did not have a linear correlation (L value: 0.09), representing that the frequency of rinsing had no increase by rising the consumption of toothpaste in each time of toothbrushing.

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Table 1. Questions in the checklist and the frequency of answers

	Question	Answer choices	Number (%)	No response
1	Do you use toothpaste when brushing your teeth?	Yes (Every day) Sometimes No	578 (81%) 96(13.4%) 40(5.6%)	1
2	What type of toothpaste do you use?	Both Iranian-made Foreign-made	297 (42%) 222 (31.4%) 188 (26.6%)	8
3	What properties does your toothpaste have?	Conventional Whitening Desensitizing I did not pay attention	236 (33%) 229(32%) 161(22.5%) 120 (16.7%)	
4	Do all your family members use toothpaste when toothbrushing?	Yes No	540 (75.9%) 171(24.1%)	4
5	Do all your family members share the same toothpaste?	Yes No	406 (57.2%) 304 (42.8%)	5
6	How much toothpaste do you use at each time of toothbrushing?	Pea-size Equal to length of bristles More	379 (53.5%) 263 (37.1%) 69 (9.4%)	6
7	How long is the duration of your toothbrushing?	Less than 1 minute 1-2 minutes >2 minutes I did not pay attention.	283 (39.9%) 232 (32.7%) 129 (18.2%) 65 (9.2%)	6
8	How do you apply toothpaste on toothbrush bristles?	Pea-size in the middle Covering the entire length of toothbrush head over the bristles I push the toothpaste to penetrate in-between the bristles	303 (43.2%) 256 (36.5%) 143 (20.4%)	13
9	When do you use toothpaste for toothbrushing?	Every time I brush my teeth Only at bed time Only after meals Sometime not every time Only after waking up in the morning	240 (34.3%) 192(%27.5%) 107 (15.3%) 83 (11.9%) 77 (11%)	16
10	At what age your children started toothbrushing?	1 year 2 years 3 years 4 years 5 years 6 years 7 years 8 years 9 years 10 years 11 years 12 years	5 (1.6%) 36 (11.8%) 65 (21.4%) 45 (14.8%) 52 (17.1%) 23 (7.6%) 40 (13.2%) 12(3.9%) 11(3.6%) 11 (3.6%) 3 (1%) 1 (0.3%)	411
11	At what age you started using toothpaste for your children?	1 year 2 years 3 years 4 years 5 years 6 years 7 years 8 years 9 years 10 years 11 years 12 years	5 (1.6%) 33 (10.5%) 61 (19.5%) 60 (19.2%) 59 (18.8%) 23 (7.3%) 41 (13.1%) 9 (2.9%) 8 (2.6%) 8 (2.6%) 6 (1.9%)	402
12	How many times do you rinse your mouth after toothbrushing with toothpaste?	2 to 3 times I rinse my mouth thoroughly until I no longer taste toothpaste in my mouth Once None	307 (43.7%) 171 (24.4%) 132 (18.8%) 92 (13.1%)	13

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13	Do you use dental floss and mouthwash on a daily basis?	Dental floss yes No, none of them Yes, both Mouthwash yes	253 (36.2%) 218 (31.2%) 150 (21.5%) 77 (11%)	17
14	Do you use the same type and brand of toothpaste all the time or you change it?	I change it periodically No, I usually use the same type and brand	345 (51.8%) 321 (48.2%)	49
15	Has correct toothbrushing technique been taught to you? If not, how do you brush your teeth?	Mixed Horizontally Rotationally Vertically	221 (33.4%) 169 (25.5%) 156 (23.6%) 116 (17.5%)	52
16	Do you wet the toothbrush head after applying toothpaste?	I wet the toothbrush before applying the toothpaste No Yes	279 (42.3%) 193 (29.2%) 188 (28.5%)	55
17	What points do you pay attention to when purchasing a toothpaste?	Manufacturing country Production and expiration dates Having the required standard and authenticity labels Price Amount of fluoride Taste Manufacturing company Packaging Information provided by the seller None of the above	304 (42.5%) 277 (38.7%) 265 (37.1%) 211 (29.5%) 208 (29.1%) 175 (24.5%) 175 (24.5%) 102 (14.3%) 77 (10.8%) 42 (5.9%)	
18	Where do you usually buy toothpaste from?	Pharmacy or drugstores Chain grocery stores Shops Badgers None of the above	414 (57.9%) 289 (40.4%) 164 (22.9%) 34 (4.7%) 26 (3.6%)	

Table 2. Correlation of "duration of toothbrushing" and "use of mouthwash and dental floss on a daily basis"

Duration of tooth brushing	Dental floss	Mouthwash	Both	None	Total
<1 minute	(29.8%) 82	(8.3%) 23	(23.3%) 64	(38.6%) 106	275
1-2 minutes	(45.4%) 104	(11.4%) 26	(14.4%) 33	(28.8%) 66	229
>2 minutes	(35.4%) 45	(16.5%) 21	(30%) 38	(18.1%) 23	127
Did not pay attention	(31.1%) 19	(11.5%) 7	(24.6%) 15	(32.8%) 20	61

Table 3. Correlation of the "amount of toothpaste used for each time of toothbrushing" and "frequency of rinsing the mouth after toothbrushing with toothpaste"

Amount of toothpaste used/Frequency of rinsing	None	Once	2-3 times	Thorough rinsing	Total
Pea size	(11.5%) 43	(18.4%) 69	(47.7%) 179	(22.4%) 84	375
Equal to length of bristles	(13.9%) 36	(15.4%) 40	(42.1%) 109	(28.6%) 74	259
More	(18.5%) 12	(35.4%) 23	(27.6%) 18	(18.5%) 12	65

Table 4 displays the correlation of the "amount of toothpaste used in each time of toothbrushing" and "duration of toothbrushing". The Chi-square test demonstrated a significant correlation between the aforementioned two variables (P<0.001), and a linear correlation was also noted between them (L value=0.00). By an increase in the amount of toothpaste, the duration of toothbrushing exceeded 1 minute.

Table 4. Correlation of the "amount of toothpaste used in each time of toothbrushing" and "duration of toothbrushing"

Duration of toothbrushing/ Amount of toothpaste used	< 1 minute	1-2 minutes	>2 minutes	Did not pay attention	Total
Pea size	(47.1%)178	(28.6%)108	(15.3%) 58	(9%) 34	378
Equal to length of bristles	(35.5%) 93	(38.5%)101	(19.8%) 52	(6.2%) 16	292
More	(17.9%) 12	(34.3%) 23	(28.4%) 19	(19.4%) 13	67

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Discussion

This study assessed the pattern of utilization of toothpaste in an Iranian population. The results showed that about three-fourths of the study population and their family members used toothpaste when brushing their teeth while around half of the families shared the same toothpaste. More than half of the subjects reported using a pea-size amount of toothpaste for each time of toothbrushing, and the majority of them stated rinsing their mouth after toothbrushing 2 to 3 times. More than two-thirds of the participants spent less than 2 minutes for brushing their teeth. The most important points to consider when purchasing a toothpaste were reported to be the manufacturing country, production and expiration dates, having the required standard and authenticity labels and price. The least important factor was the information provided by the seller.

Studies on the pattern of toothpaste consumption are limited and the majority of relevant studies have evaluated the characteristics of toothpastes and their types. Vani et al. [8] evaluated the toothpaste brands and behavior of the consumers in Bangalore city. The results demonstrated that 80% of participants used toothpastes, which is in agreement with our findings. In their study, price (40%) was a more important factor than packaging (15%) when purchasing a toothpaste, which is in line with our results. Dani [13] evaluated the behavior of consumers in purchasing toothpaste in an urban population in India and concluded that 92% of them used toothpaste.

This value was 81% in the present study. In their study, the manufacturing company was a more important factor than price, which is different from the results of the current study. However, in both studies, packaging was the least important factor. Mutreja and Shah [4] evaluated the factors affecting selection of a brand of toothpaste for purchase and concluded that over 40% of people were influenced by the brand and manufacturing company when purchasing a toothpaste. This finding is disagreement with the results of the ongoing study. In the present study, the most important factor in selection of a toothpaste was the manufacturing country, production and expiration dates and price. Ozbek et al. [14]

Compared the toothbrushing habit of elementary school students and their parents and found that duration of toothbrushing was >2 minutes in over half of the individuals while less than 50% of subjects in our study spent >2 minutes toothbrushing. Thus, our results are different from theirs in this respect. Moreover, they demonstrated that less than 10% of their study population reported daily use of dental floss and mouthwash, which disagree with our results in this regard. Murtomaa et al. [15] evaluated the use of dental floss by students in Finland and observed that 35% of students used dental floss but only 2% reported daily dental flossing. Considering the fact that in our study over half of the subjects used dental floss on a daily bases alone or in combination with mouthwash, their results are incompatible with ours. El Bcheraoui et al. [16]

Assessed the use of oral hygiene measures in Saudi Arabia and reported that over half of the subjects did not use dental floss on a daily basis. The reason for this difference is, we concentrated on oral health education in the public level on the use of dental floss. As over half of the subjects used dental floss daily in the ongoing study, their results were different from ours. Arcury et al. [17]

Assessed the oral health self-care behavior of adults residing in rural areas and reported that 77.9% of subjects applied mouthwash for daily oral hygiene but this rate was 11% in our study. Macgregor et al. [18] evaluated the toothbrushing motions and concluded that the most commonly used toothbrushing motion was vertical motion, which is not similar to the present results, since in our study a mixture of horizontal, rotational and vertical motions had the highest frequency, and only 17.5% reported toothbrushing with vertical motions alone. In our country, people usually use their own method for toothbrushing not based on expert education. Bennadi et al. [19]

Assessed the use of toothpaste by preschool children and demonstrated that 62% of mothers started brushing the teeth of their children when they passed one year of age. This result was in line with our findings because in the current study, 86.5% of people reported that they started brushing the teeth of their children after they passed the age of 3 years.

The present study showed that by an increase in duration of toothbrushing, the frequency of using both dental floss and mouthwash enhanced. This result illustrates oral hygiene behaviors are related together. Besides, the ongoing study suggested that by elevating the consumption of toothpaste in each time of toothbrushing, the frequency of rinsing did not increase. However, rising the amount of toothpaste causes the increase in the duration of tooth brushing. Rinsing with

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water after brushing is part of the oral health behavior of individuals. Nevertheless, several studies recommended that post-brushing rinsing with excessive water may decrease the caries-reducing effect of fluoride toothpaste. [20, 21]

Conclusion

Considering the results of the current study, the usage pattern of toothpaste among family members in Tehran, Iran is not adequately high, and instructions are required in this respect.

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Conflict of interest: There is no conflict of interest to declare.

Authors' Contributions

The study was designed by Sorour Soltani, Hossein Hessari, Reza Yazdani defined the conceptual content of the research. The study data were collected by Sorour Soltani [1]. Statistical analysis and interpretation of data were accomplished by Sorour Soltani, Reza Yazdani. Preparation of manuscript was performed by Sorour Soltani, Hossein Hessari, Reza Yazdani. Study supervision was performed by Reza Yazdani.

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