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Comparative Assessment Of Frequency Of Sugar Intake and Oral Hygiene Practices On Dental Caries Between South Indian and Malaysian Population

Research Article

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Abstract

Aim: To compare the frequency of sugar intake and oral hygiene practices on dental caries between South Indian and Malaysian population.
Materials and Methods: A Cross-sectional study was conducted among South Indian and Malaysian Population. A total of 200 patients were randomly selected from two Malaysian Universities (Universiti Kebangsaan Malaysia & Universiti Malaya), Kuala Lumpur and out patients from Saveetha dental college, Sri Ramachandra University which constituted the South Indian population. A self-administered questionnaire was used in the present study that had 13 questions. The questions ranged from general questions related to intake and frequency of sweets/sugar consumption and also the frequency of tooth brushing. Data was entered in MS Excel sheet and was subjected to statistical analysis using IBM SPSS software version 20.0. Descriptive statistics were expressed by means of frequency and percentage. Chi-square test was performed to find the association between the variables.
Results: More than 65% of the patients who participated in the survey from both the age groups as well as countries agreed that they consume sugar before sleep. About 53% of the 18-29-year-old Malaysian and Indian population said that they only brush once daily where as in the other age group, 75% of the Indian population and 58.1% of the Malaysian population from the test group said that they only brush once daily.
Conclusion: The result of the study indicates that the sugar consumption by the older population of both countries is higher than the younger group. Out of the 80% of youths, around 60% have gotten fillings done. Out of the 67% of Indian population and 58% of the Malaysian who have visited the dentist, 78% and 88% of them respectively have gotten fillings done.
Clinical Significance: Dental caries is the most prevalent disease, and is caused due to unhealthy nutritional habits and poor oral hygiene. The relationship between sugar intake, which includes the type of sugar being consumed in relation to the dietary intake of the patients and the oral hygiene assessment of the patients to the prevalence of Dental caries should be explained to the patient as a method of prevention or as a platform to reduce the severity and occurrence of Dental caries. Hence, the aim of this present study is to compare the frequency of sugar intake and occurrence of Dental caries in the South Indian population and Malaysian population.

Keywords: Dental Caries; Malaysian; South Indian; Sugars; Sweets.

Introduction

The relation between diet and nutrition and oral health and disease can best be described as a synergistic 2-way street [1]. Diet has a local effect on oral health, primarily on the integrity of the teeth, pH, and composition of the saliva and plaque. Nutrition,

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however, has a systemic effect on the integrity of the oral cavity, including teeth, periodontium (supporting structure of the teeth), oral mucosa, and alveolar bone [2]. Alterations in nutrient intake secondary to changes in diet intake, absorption, metabolism, or excretion can affect the integrity of the teeth, surrounding tissues, and bone as well as the response to wound healing [3].

Sugars are present in drinks and food. The dental plaque forms continuously on the tooth surfaces, and when exposed to carbohydrates, bacteria present in the plaque form acid which reduces the pH in the mouth, which leads to demineralization of the teeth [1]. Over a period of time remineralisation occurs naturally, but when demineralization overlaps remineralisation, dental caries are formed on the tooth surface [4].

Many factors influence caries development, including the presence of plaque producing bacteria, innate susceptibility of tooth surfaces, and frequency of eating, oral hygiene maintenance, and availability of fluorides.

Diet and nutrition may interfere with the balance of tooth demineralization and remineralisation in several ways [5]. The diet provides sugars and other fermentable carbohydrates, which are metabolized to acids by plaque bacteria. Nutrition may affect both the anatomy and function of salivary glands. Chronic malnutrition may reduce the secretion rate of saliva and the buffer capacity of stimulated saliva but not that of unstimulated saliva. Malnutrition can adversely affect the volume, antibacterial properties, and physicochemical properties of saliva [6].

The salivary flow and its composition affect the balance of Ph levels in the tooth surfaces. Saliva contains minerals that increase the bacterial acids and promote demineralization. The more the salivary flow, the more rapid the demineralization it is the balance between acid production and salivary recovery that determines caries susceptibility [7]. The increasing availability of cariogenic foods to the public in the form of sweets, cookies, and chocolates is another cause for the increase in dental caries. Some investigators have reported that taste perceptions may be one of the major factors responsible for the amount, type, and frequency of sugar/salt consumed [8].

So, the consumption of sugar in small amounts, along with other carbohydrates consumed frequently during the day will increase the caries risk rather than large amounts eaten. Sticky foods can stay in the mouth for longer periods, thus increasing the potential for caries [9]. Consumption of sugar containing foods is believed to be on the increase in developing countries, particularly among urban residents from higher socioeconomic background [10].

Dental caries is commonly measured by the sum of decayed, missing, and filled number of teeth (DMFT index)[11]. This value has been widely applied to assess the dental caries status at the population level for public health planning and policy-making purposes [12]. The DMFT index, first introduced by Klein et al., [13] is a cumulative caries measure, which indicates caries occurrence, including past and present dental caries [14]. The DMFT index has been in use for more than 76 years, and it remains the most commonly employed epidemiological index for assessing dental caries [15]. It has been suggested that variation in diet and oral hygiene habits can account for the social and regional distribution of caries experience [16]. However, this relationship appears to be converse in the developing countries [17].

We have numerous highly cited publications on well designed clinical trials and lab studies [18-30]. This has provided the right platforms for us to pursue the current study. Our aim is to compare the frequency of sugar intake and occurrence of Dental Caries in the South Indian population and Malaysian population.

Materials and Methods

The present study design was a cross-sectional study conducted among South Indian and Malaysian Population by a simple random probability sampling method. The study was conducted in both countries simultaneously from July 2018 to March 2019. The sample size was calculated manually based on the study done by Nivedha. V et al. The final sample size estimated was 200. A total of 200 patients were randomly selected from two Malaysian Universities (Universiti Kebangsaan Malaysia & Universiti Malaya), Kuala Lumpur and outpatients from Saveetha dental college, Sri Ramachandra University which constituted the South Indian population. A written informed consent was obtained from all the participants who were willing to participate in the study with an ethical approval from the Institutional Review Board, Saveetha University. Ethical approvals were not obtained from the Malaysian Universities.

Inclusion criteria included generally healthy males and females aged 18 to 40 years of age, with at least 80% of teeth present and who were willing to undergo the study. Participants were informed priory about the need and reason for the study. Exclusion criteria were as follows: periodontitis, completely edentulous patients, multiple missing teeth, and patients hailing from outside the study area, any medical conditions that may interfere with study.

A descriptive study has been done in South India and in Malaysia for 200 patients who were divided in to two age groups. A self-administered questionnaire was used in the present study that had 13 questions. The questions were closed ended and the language used to present the questionnaire to the patients was in English. The patients had to choose the answers from the multiple choices given to them. The questions ranged from general questions related to intake and frequency of sweets/sugar consumption and also the frequency of tooth brushing.

The questionnaire included the following:

Demographic Details:

Type Of Sugar Consumed: Snacks (cookies, candies, and chocolate), fruit juice, or other sugar containing drinks. The different forms are classified as hard sugar, soft sugar, and liquid sugar. Frequency of eating sweets: A question was included in our study where each child was asked. They were also questioned about the frequency of eating sweets. (once daily, 2-3 times a day, and more than 4 times a day). The individual was questioned regarding the brushing frequency. All the information was collected in a questionnaire from the individual who participated in the study.

The statistical analysis was done by data entry in MS Excel sheet and was subjected to statistical analysis using IBM SPSS software version 20.0. Descriptive statistics were expressed by means of

frequency and percentage. Chi-square test was performed to find the association between the variables.

Results

In patients from the [18-29] (refer Table 1) age group, the most preferred sugar to be consumed are soft sugars that are chewable such as sweets and chewing gums which are consumed by 64.9% of Malaysians and 53.8% if the Indian population, this is followed by hard sugar and liquid sugars which have the same amount of consumption by the Indian population with 23.1%. The Malaysian population however consumes more hard sugar than liquid sugar. In patients from the [30-43] age group (refer Table 2), the most preferred sugar to be consumed are also soft sugars with 45.8 percent of Indians and 37.2% of Malaysians consuming it. The second most consumed type of sugar by the Indian population is liquid sugar followed by hard sugar whereas in the Malaysian population of this age group, hard sugars are preferred over the consumption of liquid sugars.

The majority of the youth population of both Malaysia and India consumes 2-3 tablespoons of sugars on a daily basis. This result can be seen in the adult population as well. The adult population of Malaysia consumes 1-3 tablespoons of sugar on a daily basis. In both countries' age group, only a very minute number of people have a sugar intake of more than 4 times a day.

The preferred form of sugar consumed by the 18-29 age group are chocolates followed by sweets and fruit juices with 61.5% of the Indian population and 54.4% of the Malaysian population consuming chocolates. The preferred form of sugar consumed by the adult Malaysian population are chocolates with 46.5% followed by sweets, 32.6% and fruit juices, 20.9% whereas the form of sugar consumed by the adult Indian population are sweets with 37.5%, followed by 35.4% of fruit juices and 27.1% of chocolates.

Sugars are consumed mostly every two hours for the youth population of Malaysia and India as well as the adult Malaysian population, with the patients in the 18-29 years age group consumes 2-4 tablespoons on a daily basis with the majority of adult Malaysian population who participated in the study consuming less than 2 tablespoons a day. However, the adult population in India tries to control their sugar consumption by limiting their sugar consumption to more than 4 hours daily with the majority of them consuming 2-4 tablespoons of sugar on a daily basis.

Table 1. Association between the South Indian and Malaysian population with the responses to the questions by the participants in the age group between 18-29 years.

Questions		South Indian population (18-29yrs)	Malaysian population (18-29yrs)	Chi-square	P value
Type of sugar consumed	Hard sugar	12(23.1%)	14(24.6%)	3.17	0.2
	Soft sugar	28(53.8%)	37(64.9%)		
	Liquid sugar	12(23.1%)	6(10.5%)		
Frequency of sugar consumption	once daily	20(38.6%)	22(38.6%)	0.46	0.98
	two to three times daily	28(53.8%)	30(52.6%)		
	more than 4 times daily	4(7.7%)	5(8.8%)		
Time interval between consumption of sugar	every 2 hours	14(26.9%)	17(29.8%)	0.68	0.71
	every 4 hours	32(61.5%)	31(54.4%)		
	more than 4 hours	6(11.5%)	9(15.8%)		
Average quantity of sugar consumed by the patient on a daily basis	less than 2 tablespoons	30(57.7%)	28(49.1%)	0.82	0.66
	2-4 tablespoons	14(26.9%)	19(33.3%)		
	more than 4 tablespoons	8(15.4%)	10(17.5%)		
Does the patient consume sugar before sleep	yes	35(67.3%)	39(68.4%)	0.15	0.9
	no	17(32.7%)	18(31.6%)		
Frequency of brushing	yes	28(53.8%)	30(52.6%)	0.16	0.9
	no	24(46.2%)	27(47.4%)		
Does the patient have any awareness pertaining to tooth decay	yes	36(69.2%)	43(75.4%)	0.53	0.47
	no	16(30.8%)	14(24.6%)		
Has the patient visited the dentist before	yes	42(80.8%)	48(84.2%)	0.22	0.64
	no	10(19.2%)	9(15.8%)		

Table 2. Association between the South Indian and Malaysian population with the responses to the questions by the participants in the age group between 30-45 years.

Questions		South Indian population (30-45yrs)	Malaysian population (30-45yrs)	Chi-square	P value
Type of sugar consumed	Hard sugar	10(20.8%)	14(32.6%)	1.66	0.44
	Soft sugar	22(45.8%)	16(37.2%)		
	Liquid sugar	16(33.3%)	13(30.2%)		
Frequency of sugar consumption	once daily	23(47.9%)	19(44.2%)	3.12	0.21
	two to three times daily	14(29.2%)	19(44.2%)		
	more than 4 times daily	11(22.9%)	5(11.6%)		
Time interval between consumption of sugar	every 2 hours	18(37.5%)	18(41.9%)	4.07	0.13
	every 4 hours	10(20.8%)	15(34.9%)		
	more than 4 hours	20(41.7%)	10(23.3%)		
Average quantity of sugar consumed by the patient on a daily basis	less than 2 tablespoons	20(41.7%)	18(41.9%)	5.51	0.06
	2-4 tablespoons	23(47.9%)	13(30.2%)		
	more than 4 tablespoons	5(10.4%)	12(27.9%)		
Does the patient consume sugar before sleep	yes	32(66.7%)	29(67.4%)	0.01	0.94
	no	16(33.3%)	14(32.6%)		
Frequency of brushing	yes	36(75.0%)	25(58.1%)	2.92	0.09
	no	12(25.0%)	18(41.9%)		
Does the patient have any awareness pertaining to tooth decay	yes	26(54.2%)	29(67.4%)	1.67	0.2
	no	22(45.8%)	14(32.6%)		
Has the patient visited the dentist before	yes	32(66.7%)	25(58.1%)	0.71	0.40
	no	16(33.3%)	18(41.9%)		

The majority of the patients in both age groups have said yes to consuming aerated drinks with 67.3% of the Indians and 64.9% of Malaysians in the 18-29 years old age group as well as 72.9% of Indians and 72.1% of Malaysians in the 30-45 years age group. The average household confectionary expenditure on a monthly basis for an Indian youth is less than 5 USD where as the average household confectionary expenditure on a monthly basis for a Malaysian youth is between 5-10 USD [31]. The adult Indian households mostly spend about less than 5 USD a month with the second highest expenditure rate being between 5-10 USD. For a Malaysian adult, there's an equal amount of choices between less than 5 USD and 5-10 USD.

More than 65% of the patients who participated in the survey from both the age groups as well as countries agreed that they consume sugar before sleep. About 53% of the 18-29-year-old Malaysian and Indian population said that they only brush once daily where as in the other age group, 75% of the Indian population and 58.1% of the Malaysian population from the test group said that they only brush once daily [32]. The awareness pertaining to tooth decay is higher in the younger group of people compared to the older group, demonstrating that the advent of social media has greatly influenced the youth regarding the importance of oral hygiene. This can also be confirmed by the following question with more than 80% of the youths have visited the dentist before but only 67% of the Indian adults and 58% of Malaysian adults have visited the dentist before. Out of the 80% of youths, around 60% have gotten fillings done. Out of the 67% of Indian population and 58% of the Malaysian who have visited the dentist, 78% and 88% of them respectively have gotten fillings done.

Discussion

Caries prevalence varies from country to country and from region to region in the same country. Geographic variables such as, climate, diet, culture, and economic factors also affect the caries prevalence [33]. Besides this, an attempt has been made to compare the findings of the present study with the findings of other studies from with in and outside the country [34]. Food habits play an important role in the causation of dental caries[35, 36]. The introduction of refined sugar (sucrose) into the modern diet has been associated with increased caries prevalence [37]. In the present study, an effort was made to find the relationship between the type of sugar consumed, the frequency of sugar consumed, and brushing habits. Based on the present study, the value of DMFT increases with increased sugar intake [38, 39]. According to Nivedha. V et al it is necessary to evaluate a patient's dietary habits in order to propose a realistic change that may lead to the reestablishment of the balance between demineralization and remineralisation [40].

The limitations faced while conducting this study was that there were geographic restrictions as all the patients were from the same region visiting their nearest hospitals in both countries. Besides that, there was a problem getting data across between two countries. Another limitation encountered was in terms of ethnicity as the cases in our study consist of only a single racial distri-

bution that can be found due to the geographical restriction in South India.

The future scope of exploration in regards to the frequency of sugar intake and oral hygiene practices on dental caries are by conducting a study with a bigger sample. Dental caries is the main problem caused in the oral cavity that can further lead to complications such as pulpitis, crown fractures as well as the tooth needing extraction if not treated soon enough. Prevention of dental caries has to be placed at an utmost importance to prevent further complications with the patients being educated on the effects of sugar intake and oral hygiene habits.

Conclusion

The result of the study indicates that the sugar consumption by the older population of both countries is higher than the younger group [41, 42]. Although the amount of sugar consumed before bed is around the similar amount for both groups, the awareness pertaining to tooth decay is higher in the younger group of people compared to the older group in both countries, demonstrating that the advent of social media has greatly influenced the youth in regards to the importance of oral hygiene [43]. This can also be confirmed by the following results with the number of youths who visited the dentist prior to this questionnaire being distributed is higher than the adults who have been to the dentist.

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