

Sugar Consumption Among Primary and Secondary Students Among Dravidian Population In South Indian And Malaysian

Research Article

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Abstract

Objective: To assess the relationship between the frequency of sugar consumption and type of sugar consumption in relation to the age of the child between the school going children among the Dravidian descent in South India and Malaysia.

Materials and Methods: A descriptive study has been done in the Dravidian population in South India and in Malaysia for 200 patients who were divided into two age groups. After clinical examination, patients who had dental caries were instructed and referred to appropriate treatment.

Results: 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. Besides this, an attempt has been made to compare the findings of the present study with the findings of other studies from within and outside the country. Food habits play an important role in the causation of dental caries. The introduction of refined sugar (sucrose) in to the modern diet has been associated with increased caries prevalence. 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. In the present study, the values of deft and its increases with increased sugar intake.

Conclusion: The study indicates that the sugar consumption by the older population of both countries is higher than the younger group. 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 curriculum and cartoons has greatly influenced the youth regarding the importance of oral hygiene.

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

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, 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. 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 [2, 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 re-

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duces the pH in the mouth. which leads to demineralization of the teeth. Over a period of time remineralization occurs naturally, but demineralization overlaps remineralization, forming caries [4].

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

Diet and nutrition may interfere with the balance of tooth demineralization and remineralization in several ways. 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. Malnutri-

tion can adversely affect the volume, antibacterial properties, and physicochemical properties of saliva [5, 6, 7].

The salivary flow and its composition. 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. 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

Figure 1. The result obtained from the primary school going children is that more Malaysians consume soft and hard candy compared to liquid candy that is consumed in a higher amount by Indians.

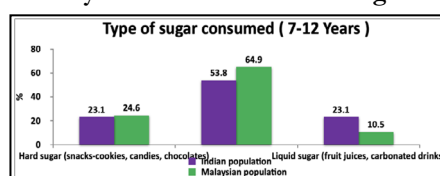


Figure 2. The frequency of sugar consumed is similar between both primary school going children in both population.

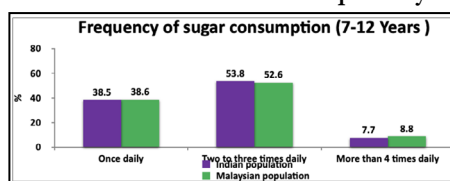


Figure 3. Indian primary school students consume more chocolates while the Malaysian primary school students prefer consuming sweets and fruit juices.

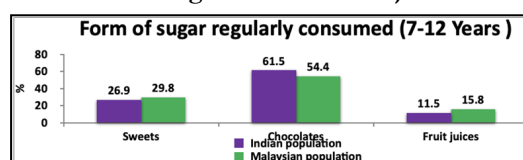


Figure 4. The time interval between sugar consumption in relation to the primary school students in India is shorter than the students in Malaysia due to the difference in the break times between the school in both countries.

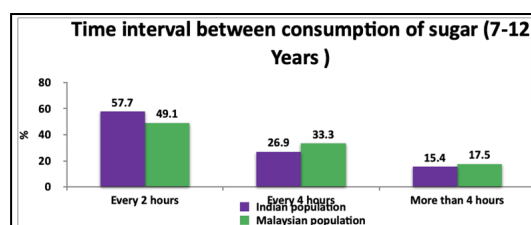


Figure 5. The number of students who consume aerated drinks in both countries are similar with two third of the population having consumed aerated drinks before.

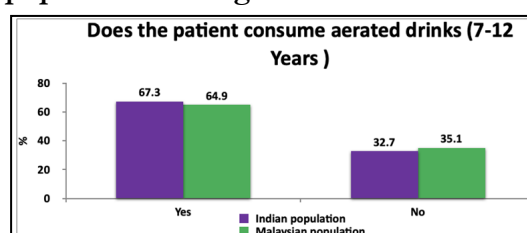


Figure 6. The average quantity of sugar consumed by the primary school students in both populations on a daily basis is similar between both populations with 2-4 tablespoons of sugar daily.

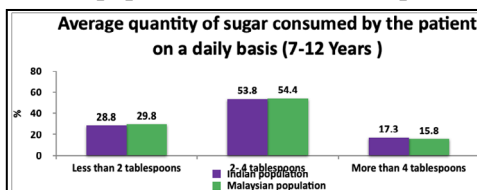


Figure 7. The highest amount of average household confectionary expenditure on a monthly basis spent by the Indian population with the majority spending less than 5 USD a month and very minimal amount of parents spend more than 15 USD a month whereas in Malaysia, the majority of the household spends 5-10 USD a month with a way higher amount of parents spending more than 15 USD a month on confectionary and this might be due to the difference of currency exchange and the spending capability.

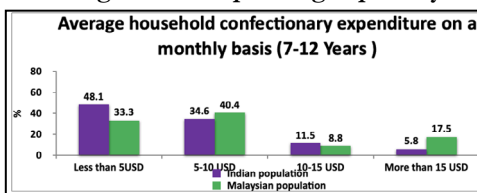


Figure 8. Two thirds of the primary school students in both countries agreed that they consume sugar before sleep.

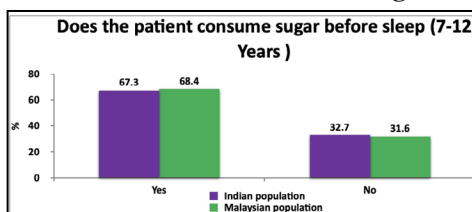


Figure 9. The frequency of brushing of the primary school going children in both countries is similar with slightly more than half of the students saying they brush once a day.

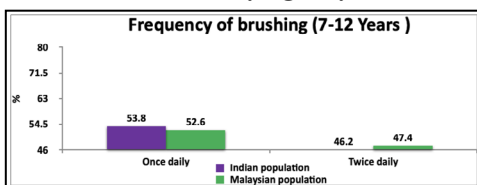
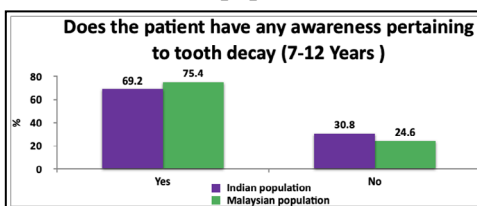


Figure 10. A higher amount of Malaysian school going children have an awareness towards tooth decay compared to the Indian population.



the caries risk rather than large amounts eaten. Sticky foods can stay in the mouth for longer periods, thus increasing the potential for caries. Consumption of sugar containing foods is believed to be on the increase in developing countries, particularly among urban residents from higher socioeconomic background [8, 9, 10].

Dental caries is commonly measured by the sum of decayed, missing, and filled number of teeth (DMFT index) (WHO, 2000). This value has been widely applied to assess the dental caries status at the population level for public health planning and policy-making purposes (Jakobsen and, 1990). The DMFT index, first introduced by (Klein et al., 1938), is a cumulative caries measure, which indicates caries occurrence, including past and present dental car-

ies. 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 (Broadbent and Thomson, 2005) [11].

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years [12-30]. With this inspiration we planned to pursue research on the frequency of sugar consumption between the primary and secondary students among the Dravidian population in South India and Malaysia.

It has been suggested that variation in diet and oral hygiene habits can account for the social and regional distribution of caries ex-

perience. However, this relationship appears to be converse in the developing countries [31].

Therefore, the present study was undertaken to determine the effect of sugar types, frequency of sugar consumption, and tooth brushing practices on dental caries among 200 individuals who are divided into two different age groups. Hence, the aim of the study is to compare the frequency of sugar intake and occurrence of Dental Caries in the South Indian population and Malaysian population.

Materials and Methods

A descriptive study has been done in the Dravidian population in South India and in Malaysia for 200 patients who were divided into two age groups. After clinical examination, patients who had

dental caries were instructed and referred to appropriate treatment.

A specially designed questionnaire was used in the present study that had 13 questions. The questions ranged from general questions related to in take and frequency of sweets/sugar consumption and also the frequency of tooth brushing.

The questionnaire included the following:

Type of sugar consumed: snacks (cookies, candies, chocolate), fruit juice, or other sugar containing drinks. The different forms are classified as hard sugar, soft sugar, liquid sugar.

Frequency of eating sweets: A question was included in our study where each child was asked individually about the frequency of eating sweets. (once daily, 2-3 times a day, and more than 4

Figure 11. The Malaysian primary school students have a 3.4 percent higher rate than Indian school going students but both countries have at least 80% of the students visiting the dentist before.

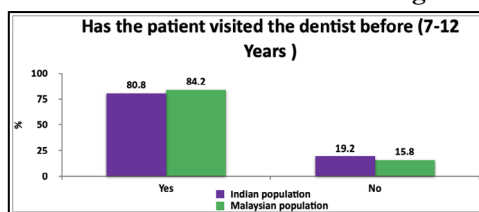


Figure 12. 60% of the Malaysian and Indian population of the school going children have had some kind of filling done.

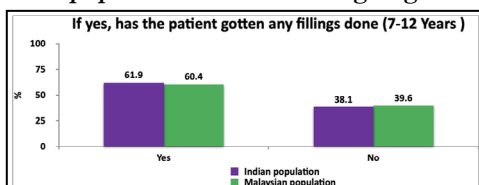


Figure 13. The result obtained from the secondary school going children is that more Malaysians consume hard sugar compared to liquid candy and soft sugar that is consumed in a higher amount by the Indians.

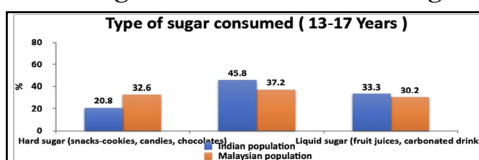


Figure 14. The frequency of sugar consumed by teenagers in India is about once daily while for the Malaysian teenagers, the majority of them consume three times daily.

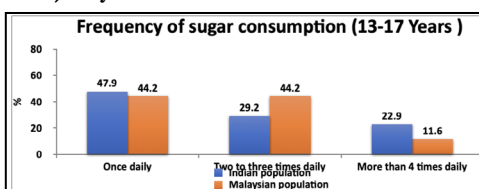


Figure 15. A higher population of Malaysian secondary school students prefer consuming chocolates followed by sweets and fruit juices whereas for the Indian secondary school students, the majority of them choose sweets followed by fruit juices and very few of them prefer chocolates.

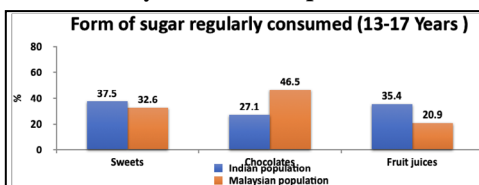


Figure 16. For the Indian teenagers most of them have a time interval of more than 4 hours before consuming sugars while the majority of Malaysian consume something sweet every two hours.

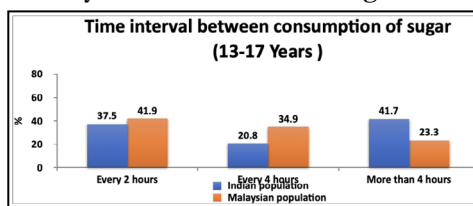


Figure 17. Nearly three quarter of both countries high schoolers consume aerated drinks.

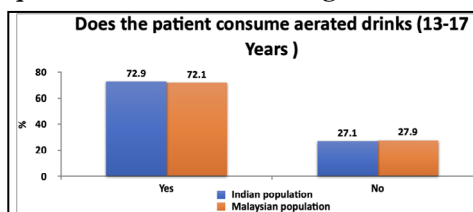


Figure 18. The average quantity of sugar consumed by the secondary school students in both populations on a daily basis is similar between both populations with less than two tablespoons of sugar daily but the majority of the Indian students consume 2-4 tablespoons of sugar a day with one-third of the Malaysian students consume more than 4 tablespoons a day.

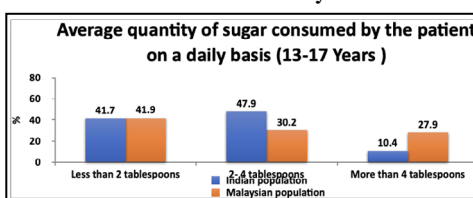


Figure 19. The highest amount of average household confectionary expenditure on a monthly basis spent by the Indian population with the majority spending less than 5 USD a month followed by 5-10 USD a month and very minimal amount of parents spend more than 15 USD a month whereas in Malaysia, there is an equal amount of the household spending of less than 5 USD and 5-10 USD a month.

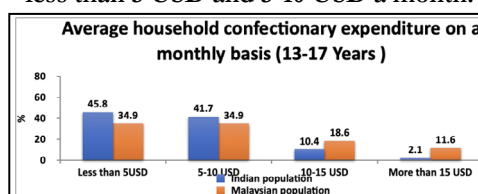
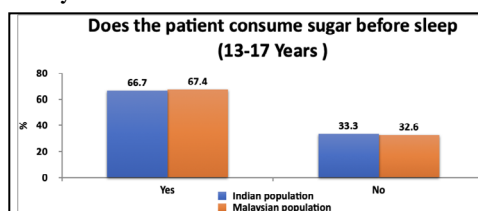


Figure 20. Two thirds of the secondary school students in both countries tend to consume sugar before sleep.



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.

Criteria:

Inclusion criteria included generally healthy males and females aged 7 to 17 years of age, school going children and who were willing to undergo the study. Participants informed priorly about the need and reason for the study. Exclusion criteria were as fol-

lows: illiterate, patients hailing from outside study area, any medical conditions that may interfere with study.

Confidentiality was maintained through out the study and the collected data were subjected to statistical analysis.

Questionnaire:

Comparative study of frequency of sugar intake which causes dental caries between the Dravidian population among Malaysian and South Indian population.

Figure 21. Three quarter of the Indian population said the only brush once a day compared to the 58% of Malaysians. A higher amount of Malaysian population brush twice daily.

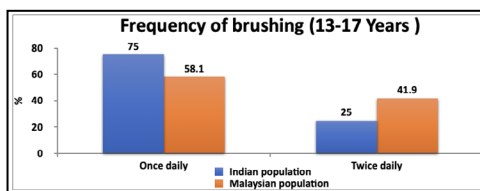


Figure 22. A higher amount of Malaysian teenagers have some sort of awareness pertaining to tooth decay compared to the Indian teenagers.

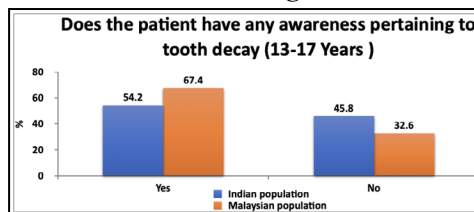


Figure 23. About two thirds of the Indian population have visited the dentist before compared to the 58% of the Malaysian population.

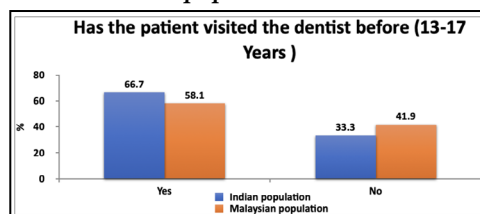
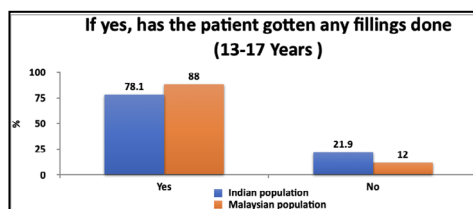


Figure 24. Out of the 58 percent of the Malaysian teenagers who have visited the dentist, 88% of them have gotten some sort of filling done whereas out of the 67% of Indian teenagers who have visited the dentist, 78% of them have gotten fillings done.



- | | |
|--|---|
| 1. Age of patient | - more than 4 hours |
| - 18-29 years old | |
| - 30-45 years old | |
| 2. Type of sugar consumed | 6. Does the patient consume aerated drinks |
| - hard sugar (snacks-cookies, candies, chocolates) | - yes |
| - soft sugar (chewables- sweets, chewing gums) | - no |
| - liquid sugar (fruit juices, carbonated drinks) | 7. Average quantity of sugar consumed by the patient on a daily basis |
| 3. Frequency of sugar consumption | - less than 2 tablespoons |
| - once daily | - 2-4 tablespoons |
| - two to three times daily | - more than 4 tablespoons |
| - more than 4 times daily | 8. Average household confectionary expenditure on a monthly basis |
| 4. Form of sugar regularly consumed | - less than 5USD |
| - sweets | - 5-10 USD |
| - chocolates | - 10-15 USD |
| - fruit juices | - more than 15 USD |
| 5. Time interval between consumption of sugar | 9. Does the patient consume sugar before sleep |
| - every 2 hours | - yes |
| - every 4 hours | - no |

10. Frequency of brushing
 - once daily
 - twice daily
11. Does the patient have any awareness pertaining to tooth decay
 - yes
 - no
12. Has the patient visited the dentist before
 - yes
 - no
13. If yes, has the patient gotten any fillings done
 - yes
 - no

Results

The results obtained from the survey revealed that in the (7-12) 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% of 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 within the (13-18) age group, 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 primary school going population in both Malaysia and India consumes 2-3 tablespoons of sugars on a daily basis. This result can be seen in the teenage population as well. The teenage population of Malaysia consumes 1-3 tablespoons of sugar on a daily basis. In both countries, only a very minute number of people has a sugar intake of more than 4 times a day.

The preferred form of sugar consumed by the 7-12 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 teenage 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 teenage Indian population are sweets with 37.5%, followed by 35.4% of fruit juices and 27.1% of chocolates.

Sugars are consumed every two hours for the primary school going population of Malaysia and India as well as the secondary school going Malaysian population, with the patients in the 7-12 years age group consumes 2-4 tablespoons on a daily basis with the majority of secondary school going Malaysian population who participated in the study consuming less than 2 tablespoons a day. However, the secondary school going 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.

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 7-12 years old age group as well as 72.9% of Indians and 72.1% of Malaysians in the 13-18 years age group. The average household confectionary expenditure on a monthly basis for an Indian child is less than 5 USD whereas the average household confectionary expenditure on a monthly basis for a Malaysian child is between 5-10 USD. The teenage Indian household mostly spends about less than 5 USD a month with the second highest expenditure rate being between 5-10 USD. For a Malaysian teenager, 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 and countries agreed that they consume sugar before sleep. About 53% of the 7-12-year-old Malaysian and Indian population said that they only brush once daily whereas in the other age group, 75% of the Indian population and 58.1% of the Malaysian population from the test group gave the same answer. The awareness pertaining to tooth decay is higher in the younger group of people compared to the older group, demonstrating that the advent of parents, teachers and cartoons has greatly influenced the children regarding the importance of oral hygiene. This can also be confirmed by the following question: more than 80% of the children have visited the dentist before but only 67% of the Indian teenagers and 58% of Malaysian teenagers have visited the dentist before. Out of the 80% of children, 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 [31, 32]. Besides this, an attempt has been made to compare the findings of the present study with the findings of other studies from within and outside the country [33]. The result obtained from the primary school children is that more Malaysians consume soft and hard candy compared to liquid candy that is consumed in a higher amount by Indians whereas the result obtained from the secondary school going children is that more Malaysians consume hard sugar compared to liquid candy and soft sugar that is consumed in a higher amount by the Indians shows that food habits play an important role in the causation of dental caries. A similar study conducted by Shohei Shimamura among Japanese population showed that children in two primary schools and a junior high school in Kameoka City, Kyoto Prefecture had little influence on caries attack, and the living standards of the inhabitants were more or less the Japanese average which was influenced by the fluoride contained in their drinking water. The results from their oral examinations were summed up to be used as data. It was 16.8kg in 1962, 18.9kg in 1965, and 21.2kg in 1967. The diagnostic standards of caries used here were more severe than the usual standards of a sticky feeling in pits and fissures and a soft feeling on smooth surfaces. This report showed that the Japanese primary and secondary school children population has a lower sugar consumption compared to Malaysian and South Indian group of school children [33, 34].

The introduction of refined sugar (sucrose) into the modern diet has been associated with increased caries prevalence [35]. 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, the present study, the values of deft and its increments with increased sugar intake. The majority of the primary school going population in both Malaysia and India consumes 2-3 tablespoons of sugars on a daily basis. This result can be seen in the Indian teenage population as well. The teenage population of Malaysia consumes 1-3 tablespoons of sugar on a daily basis due to the consumption of heavier breakfast and tea time meals. The frequency of sugar consumption varies between every 2 hours, every 4 hours and more than 4 hours among all the students due to variations in their school schedules. Another similar study conducted based in New York by Leonard et al, showed overweight youth of today are faced with temptations to eat larger portion sizes (mostly carbohydrate, sugary products) and to be sedentary. They have compared the carbohydrate consumption of their population now and 20 years ago. They revealed that the current generations are more prone to obesity compared to then. However, when compared to the South Indian (Dravidians) and Malaysian population, their (Caucasians) populations consume more sugar in the form of carbohydrate and lead to obesity in younger age (adolescent) [36, 37].

The monthly expenditures of the Indian populations of both primary as well as secondary school students are USD 5 with the Malaysian population of the same category spends USD 5-10 monthly. This can be seen due to the higher cost of living as well as exchange rates difference in regards to the currencies in both countries. The existence of sodas and carbonated drinks has played a big role in the daily food intake due to their cheap prices and advertisements to win over the crowd of students in their specific educational institutions in their respective countries.

The result of the study indicates that the sugar consumption by the younger population of both countries is higher than the older group due to primary school students having longer and frequent breaks during their school sessions [38, 39]. Although both primary and secondary schools students consume sugar before bed and majority of them brushes their teeth only once daily, 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 curriculum and cartoons in the present times has greatly influenced the youth regarding the importance of oral hygiene [40].

Conclusion

Dental caries is one of the leading causes of dental problems, and is frequently associated with the amount of sugar consumption. In our study, we have found that there is a significant correlation between the students visiting dental clinics and the restorations done. We can observe a significant growth between dental caries and sugar consumptions. In this regard, it will be necessary to promote compulsory oral screenings every 6 months for all school students in Malaysia and India.

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