IJBPAS, August, Special Issue, 2021, 10(8): 643-660

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

AWARENESS ON EARLY DENTAL CARIES AND ITS RELATION WITH DIETARY CARBOHYDRATES - A SURVEY

NGOUBINAH PRETTY TM[1], SASANKA L K[2*], HANNAH R[3] AND ARIGA P[4]

1: Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077

2: Assistant Professor, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077

3: Assistant Professor, Department of Oral and Maxillofacial Pathology and Microbiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University

4: Professor, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai - 600077

***Corresponding Author: E Mail: Dr. L. Keerthi Sasanka: keerthis.sdc@saveetha.com**

Received 19th March 2021; Revised 25th April. 2021; Accepted 20th May 2021; Available online 1st Aug. 2021

https://doi.org/10.31032/IJBPAS/2021/10.8.1044

ABSTRACT

Dental caries is a chronic disease which can affect at any age. The role of sugar is a risk factor in the initiation and progression of dental caries. Dental caries is a dynamic process that involves susceptible tooth surfaces; cariogenic bacteria like streptococcus mutans and fermentable carbohydrate sources. Frequent consumption of carbohydrates in the forms of simple. Many factors in addition to sugar affect the caries process; including the form of food or fluid; the duration of exposure; nutrients composition; sequence of eating; salivary flow; presence of buffers; and oral hygiene. A well structured questionnaire comprising 15 questions covering

socio-dermatographic information; knowledge; attitude; perception was framed and administered to the participant through an online google form link. The data was collected and statistically analysed using SPSS software. The study aims to create awareness about the consumption of carbohydrates that leads to early dental caries and various causes that cause dental caries; this condition can be prevented if appropriate measures are taken.

Keywords: Dental caries; Tooth decay; Sugar; Carbohydrates; *Streptococcus mutans*

INTRODUCTION

Although sugars are undoubtedly the most important dietary factors in the aetiology of dental caries, today's food contains an increasing range of formant formant double carbohydrates including highly processed starch containing food and foods that contain novel synthetic carbohydrates such as oligofructose; sucralose and glucose polymers sugars can be readily metabolised by many bacteria involved in dental by four biofilm formation generating acid help my products that can lead to demand realisation of the tooth structure **[1]**. The prevalence of dental caries in industrialised countries remains high despite progress with fluoride protection and other preventive measures. Dental caries cause pain and anxiety in addition to causing time from work and school and in young children untreated decay is a common case of hospitalisation **[2]**. While the casual relationship between sucrose and dental caries development is indisputable the relationship between food starch in dental caries continues to be debated. Studies of care in animals; human plaque pH response **[3]**; and enamel or dentine demineralisation leaves no doubt and processed food starch in the modern human diet is significant carcinogenic potential **[4]**.

Dental caries is a biofilm developed oral disease and fermentable dietary Carbohydrates are key environmental factors involved in its initiation and development **[3, 5]**. Carbohydrates; sucrose is considered the most carcinogenic because in addition to being formatted by an oral bacteria it is a substrate for the synthesis of extracellular and intracellular polysaccharides **[4, 6]**. The WHO recommendations are intended for use by the policy makers as a benchmark for assessing intake of sugar by populations and as a driving force for policy change **[7]**. Dental caries is a chronic cumulative disease; and carries the status of an individual develops over time. Caries occur at any stage in life **[8]**, provided that an individual has susceptible teeth remaining **[9]**. Biological; behavioural; and environmental factors act

upon the dentition throughout life; suggesting that the life-course approach is relevant to dental caries epidemiology **[10]**.

Studying the natural history of dental caries is important; as it will identify those periods in life when risk of disease is highest; and it will indicate when and where intervention was most required **[11]**. Substantial experience or dental restoration and loss due to carry was observed among study members as they moved from the third decade of life into the fourth **[12]**. The aim of this study was to create awareness on consumption of carbohydrates that lead to early dental caries.

MATERIALS AND METHOD

The study involved awareness on consumption of carbohydrates leading to early dental caries of age 17 - 25 years. A well structured questionnaire comprising 14 questions covering the social demographic information, knowledge, perception was framed and administered to the participants through the google form link. This study was conducted during the month of June 2020.

In this prospective observational study the pros are economical, easy to create, gather large data, quick interpretation, wide reach, heterogeneous population and cones are response bias and survey fatigue. The study was approved by the scientific review board, Saveetha Dental College Chennai. Sample size was 100 college students, a simple random sampling method that is done to minimise response bias measures taken for minimising error are external and internal validity. Demographic information symptoms and effect were the output variables. The descriptive statistics was done using SPSS software. Education, sex, knowledge, height and exposure were independent variable where as interaction, knowledge come on attitude and perception.

RESULT AND DISCUSSION

54.8% of the population or female and 45.2% of the population of male **[Figure 1]** 98.2% of the population things sugar can cause dental care and 1.8% of the population did not agree **[Figure 2]** 91.4% of the population were aware of carbohydrate food cause early dental caries and 3.6% of the population were not aware **[Figure 3]** 73.8% of the population have dental care and 26.2% of the population did not have **[Figure 4]** 97% of the population to rinse their mouth after they eat and 3% of the population do not rinse **[Figure 5]** 87.5% of the population eat sugar every day and 12.5% of the population Do not eat sugar every day **[Figure 6]** 96.4% population are aware of consumption of sugar can cause various diseases and 3.6% of the people were not aware **[Figure 7]** 94.6% of the population

were aware where the sugar stand in the food pyramid and 5.4% of the people do not know **[Figure 8]** 98.8% of the population as fructose and 2.2% of the population do not know **[Figure 9]**, 99.9% of the population says dental caries are preventable **[Figure 10]** 67.3% of the population to have genetically problem regarding dental caries and 32.7% do not have **[Figure 11]** 99.2% of the population taught we should brush two times a day and 1.3% said one time a day **[Figure 12]** 61.9% of the population oral-B is good for tooth caries and 32.1% said Colgate and 3.3% said Pepsodent and 2% tell meswak **[Figure 13]** 95.8% of the population says children eating fast foods will have more dental caries and 4.2% says no **[Figure 14]**.

In the recent study, 15.7% children and 23.7% of adults had untreated dental caries according to this study 73.8% of the population had dental caries **[13]**. In the similar study 9% were male and 6.8% were female According to this study 54.8% were female and 45.2 were male **[14]**.

In the recent article the author said that the low pH environment triggers the shift of the resident plaque microflora to a more cariogenic one they concluded that low concentration of ca, pi, and F in the matrix of the whole dental biofilm formed in the presence of sucrose can be an addition factor contributing to the cariogenicity of this carbohydrate **[15]**.

In a previous study by the author **[12, 16]** concluded that self-reported dietary measures were not associated with tooth decay. Most added sugar we're from sugar-sweetened fruit drinks consumed at home **[12, 16]**. In the previous article the author also concluded that reduction of sugar availability was related to marked caries reduction in Iraqi children over a 5 years period **[17]**. In this study 7.3% of total daily calories were from sugar sweetened beverages according to this study 87.5%of the population det sugar every day **[18]**. They also concluded that sugar related behaviour in pediatric patients and advocates for board upstream approach including taxes, warning levels and policy changes that can help to reduce added sugar intake; prevent tooth decay and improve health outcomes in vulnerable child populations **[19]**. In the recent article the author concluded that the oral health care practitioner can identify added sugars intake and provide guidelines to patients to decrease their intake of added sugar while improving nutrient intake and reduce caries risk **[20]**.

In previous articles it was concluded that sugar and oral health are integrally related **[21]**. Dietary guidelines for prevention and

management of dental caries provide a framework for consumers and health professionals to use in managing the intake of sugars **[22]**. In the recent articles the author concluded that the contribution of dietary sugar to caries developed and the role of lifestyle change to combat dietary sugar intake; **[23]** there was a need for more clinical trials to assess the effectiveness of intervention based on psychological theory in reducing dietary sugar intake among adults **[24]**. In the similar study the author concluded that Dental caries progress with age and the effect of sugar on dentition are lifelong **[25]**. Even low levels of caries in childhood are of significant to level of caris throughout the life-course **[26]**. In the recent article it was said that each child's gender; age; fluoride history; socioeconomic state of the family **[27]**; previous dental experience; brushing habits; and nutrients intake were examined as independent variables **[28]**. Dental and oral health problems that often occur in children aged 6-12 years located in hard tissue are carried as measured by decay; missing **[29]** filling teeth and those located in the soft tissue are periodontal disease; and gingival index and also community periodontal index in cross section students **[30]**.

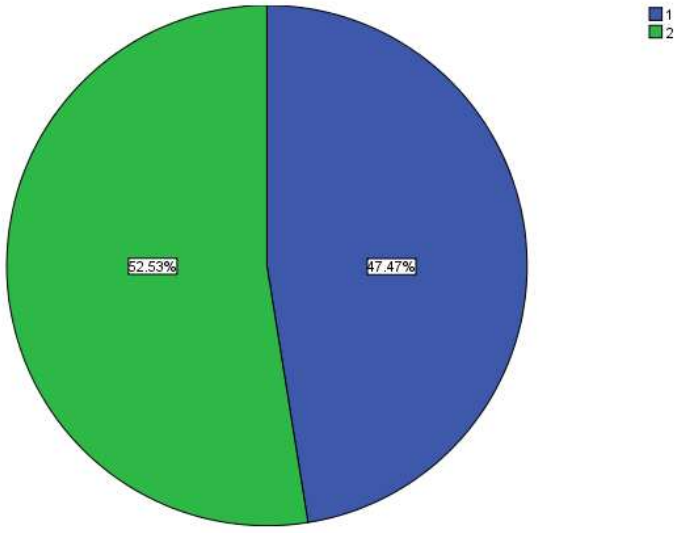

Figure 1: Pie chart showing the gender distribution of the participants, where green represents male 52.53% and blue represents females 47.47%.

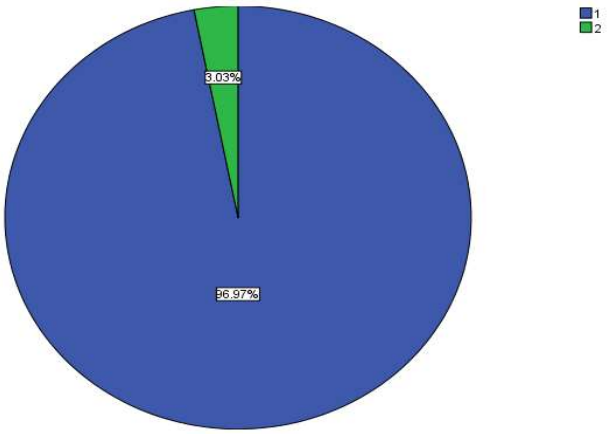

Figure 2: Pie chart showing respond to the question," Do you think sugar can cause early dental caries," blue represent yes (96.97%) and green represent no (3.03%)

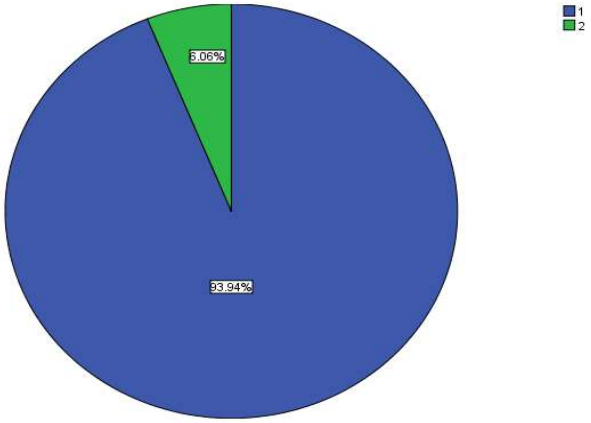

Figure 3: Pie chart showing the response to the question," Do you know carbohydrate food cause early dental caries," blue represent yes (93.94%) and green represent no (6.06%)

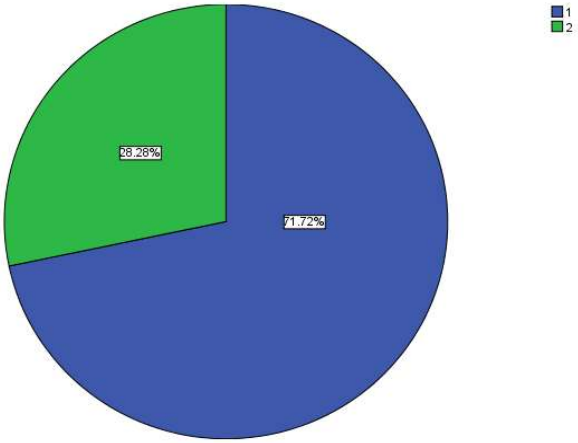

Figure 4: Pie chart showing the to response to the question," Do you have dental caries," blue represent yes (71.72%) and green represent no (28.28%)

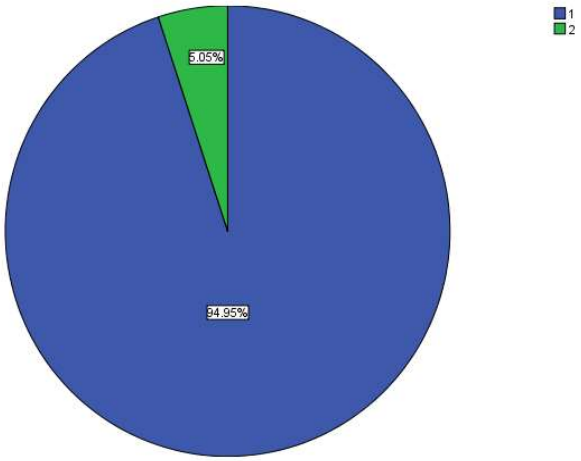

Figure 5: The above pie chart showing the response to the question," Do you rinse your teeth after you eat," blue represent yes (94.95%) and green represent no (5.05%)

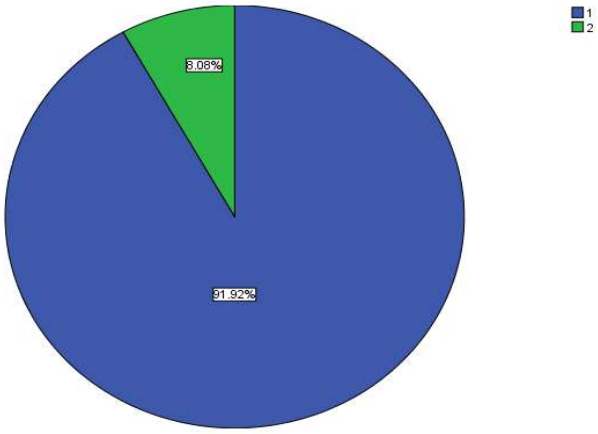

Figure 6: The above pie chart showing the response to the question," Do you eat sugar food everyday," blue represent yes (91.92%) and green represent no (8.08%)

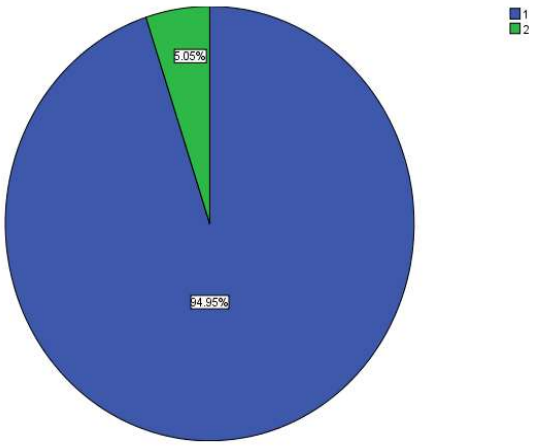

Figure 7: The above pie chart showing the response to the question;" Are you aware consumption of sugar substances can cause various diseases," blue represent yes (94.95%) and green represent no (6.05%)

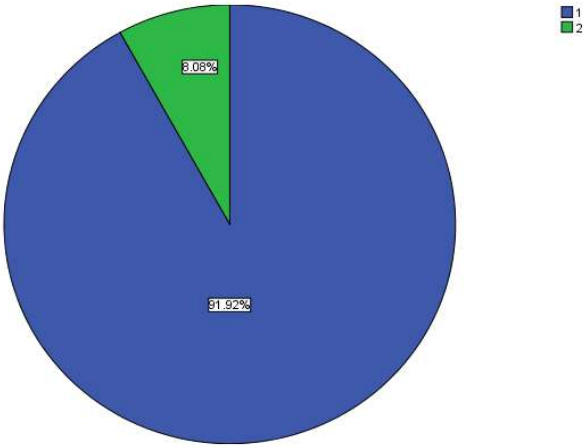

Figure 8: The above pie chart showing the response to the question," Do you know where the sugar stand in the food pyramid," blue represent yes (91.91%) and green represent no (8.08%)

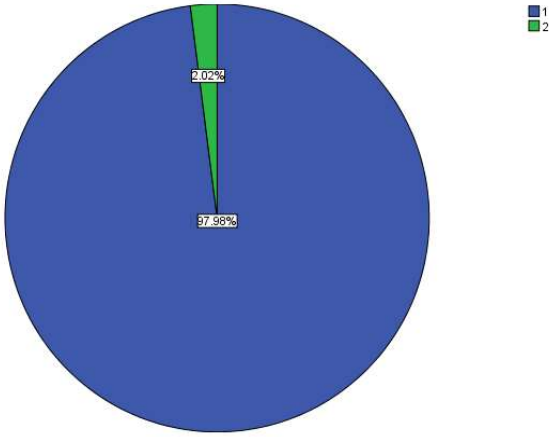

Figure 9: The above pie chart shows the response to the question," Do you know fruit sugars are known as fructose," blue represent yes (97.96%) and green represent no (2.02%)

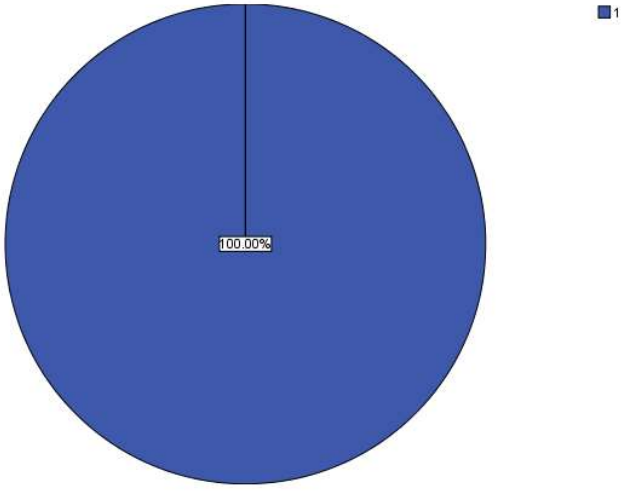

Figure 10: The above pie chart shows the response to the question," percentage of dental caries preventable 100% yes (blue)

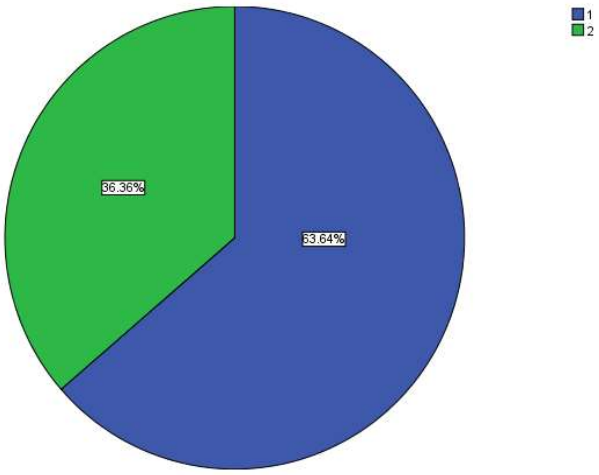

Figure 11: The above pie chart shows the response to the question,"Do you have genetic problem regarding dental caries," blue represent yes (63.64%) and green represent no (36.36%)

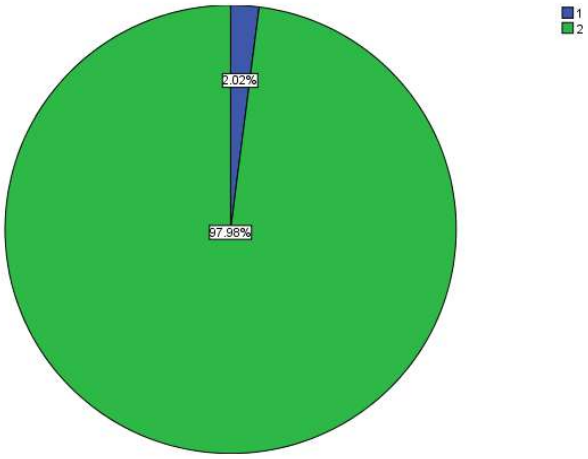

Figure 12: The above pie chart shows the response to the question," How many times Brushing is recommended per day," blue represent one (2.02%) and green represent two (97.98%)

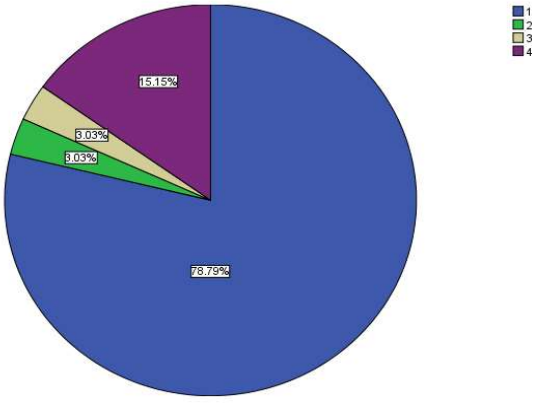

Figure 13: The above pie chart shows the response to the question," What kinds of toothpaste is recommended for tooth caries," blue represent oral-B (79.79%), green represent meswak (3.03), cream represent pepsodent (3.03%), purple

represent colgate (15.15%)

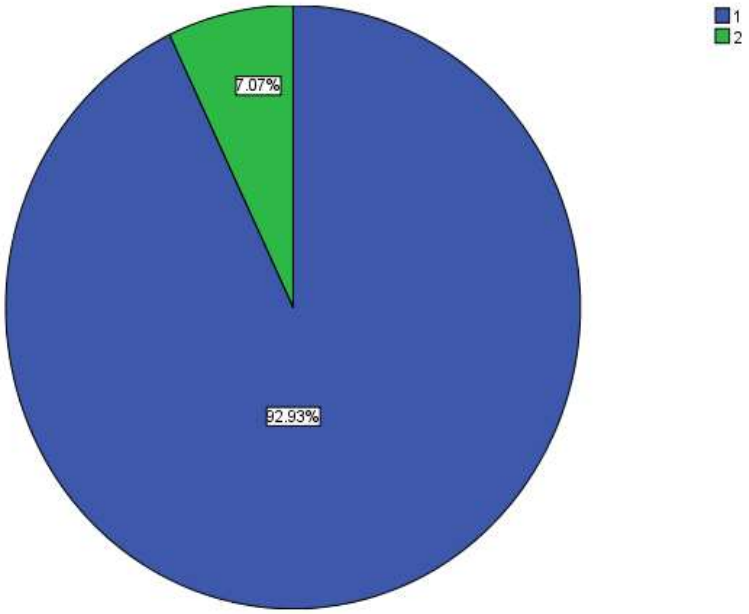

Figure 14: The above pie chart shows the response to the question,"Children eating fast food are most likely to have more dental caries. blue represent yes (93.92%) and green represent no (7.07%)

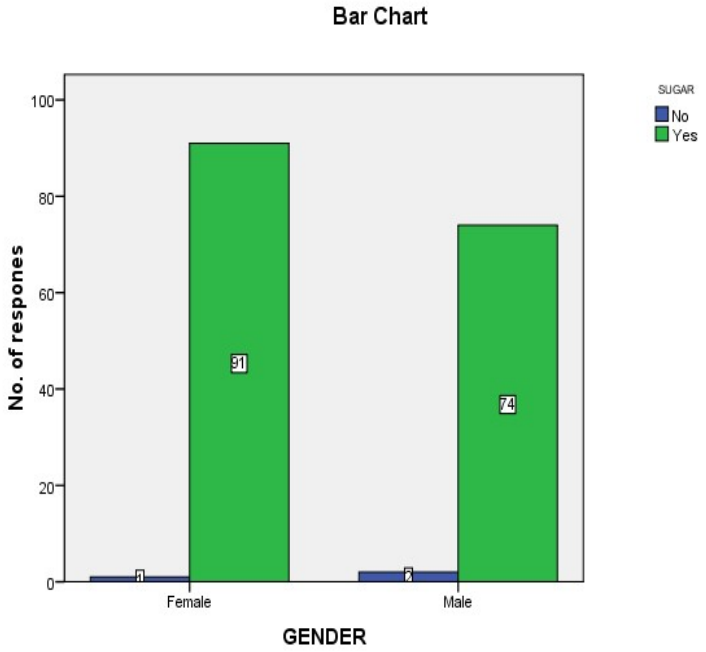

Figure 15: The bar graph represents the association between gender and awareness on sugar intake leading early dental caries. X axis represents the gender and Y axis represents the number of responses. No (blue) Yes (green) Chi square analysis was done (Pearson's chi square value-0.457, p value- 0.499 (P>0.05) statistically not significant. Although statistically not significant majority of females (91%) are more aware about increased sugar intake may lead to early dental caries rather than males.

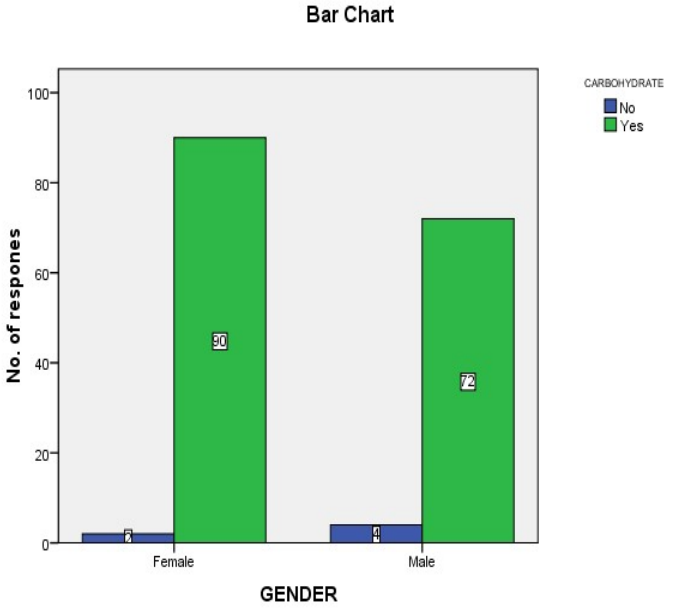

Figure 16:The bar graph represents the association of gender with opinion on carbohydrate food causing early dental caries. X axis represents gender and the Y axis represents the number of responses. No (blue) Yes (green) Chi square analysis was done. (Pearson's chi square value-0.943, p value- 0.331 (P>0.05) hence statistically not significant. Although statistically not significant majority of females (9o%) are more aware about high carbohydrates in diet may lead to early dental caries rather than males.

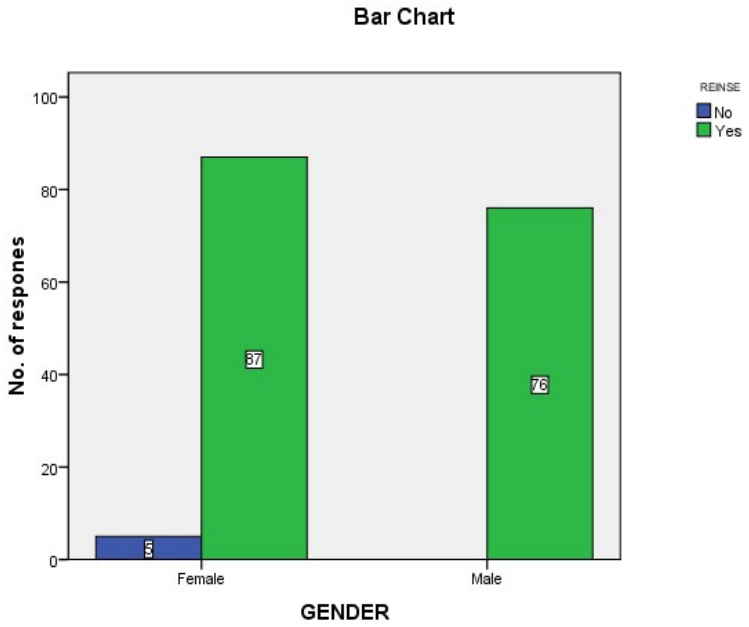

Figure 17: The bar graph represents the association of gender with the habit of rinsing mouth after eating. X axis represents the gender and the Y axis represents the number of responses. No (blue) Yes (green). Chi square analysis was done. Pearson's chi-square value-4.760, p value- 0.029 (P<0.05) hence statistically significant. This proves that the majority of females (97%) has a habit of mouth rinsing immediately after eating food rather than males.

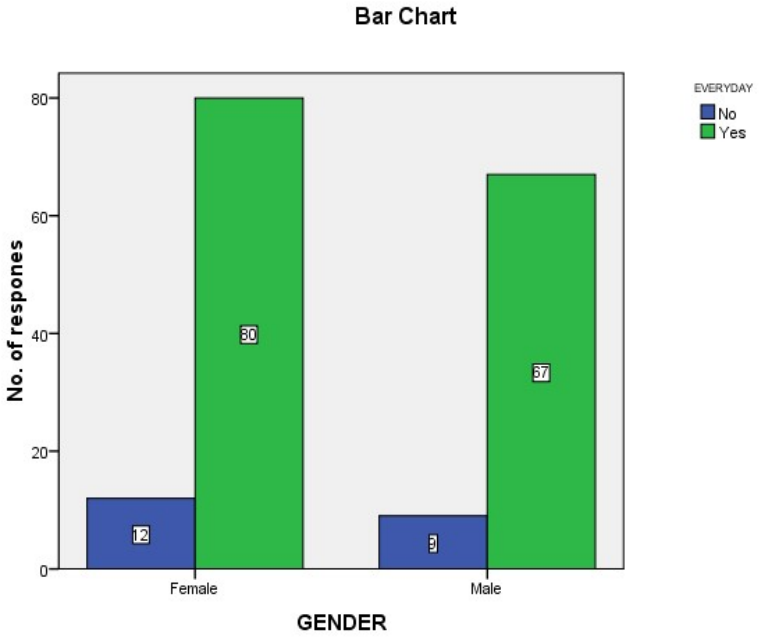

Figure 18: The bar chart represents the association of gender with the population who eats sugar everyday. X axis represents the gender and Y axis the number of responses. No (blue) Yes (green). Chi square analysis was done. (Pearson's chi-square value-0.788) p value- 0.375 (P>0.05), hence statistically not significant. Although statistically not significant, majority of the females (80%) consume sugary substances everyday rather than males.

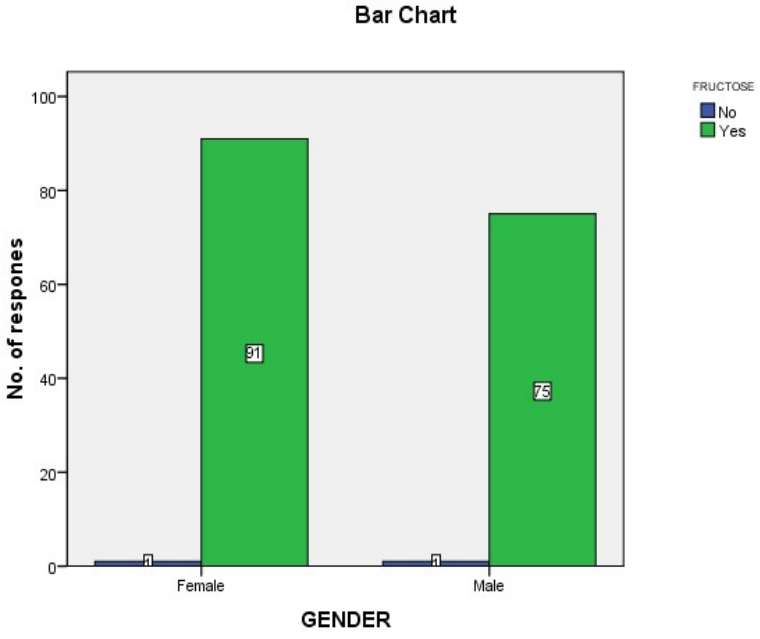

Figure 19: The bar chart represents the association between the gender and awareness regarding the fruit sugar known as fructose. X axis represents gender and the y axis represents the number of responses. No (blue) Yes (green). Chi square analysis was done. Pearson's chi-square value-0.005 and p value - 0.942 (P>0.05), hence statistically not significant. Although statistically not significant majority of females (91%) are aware about fruit sugars rather than males.

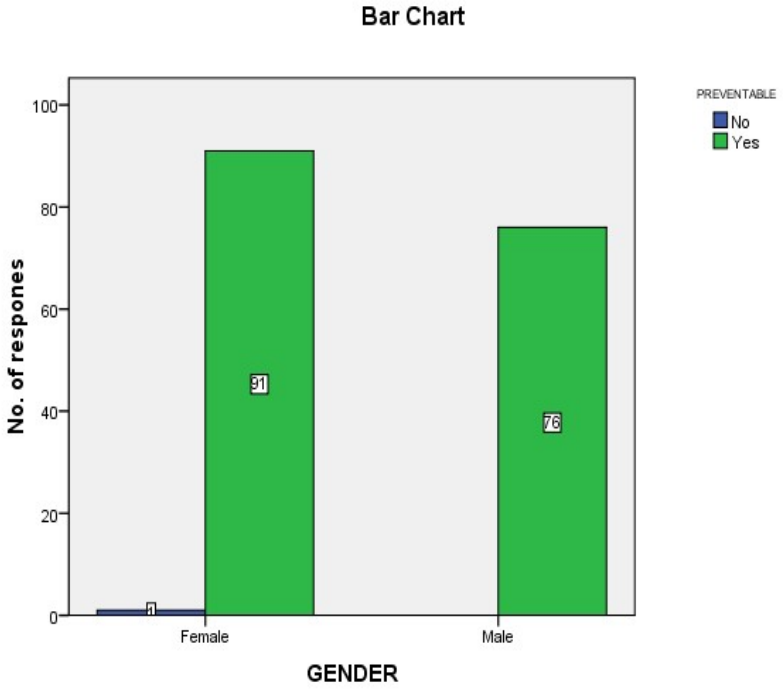

Figure 20: The bar chart represents the correlation between the gender and awareness regarding dental caries prevention. X axis represents gender and the y axis represents the number of responses. No (blue) Yes (green).

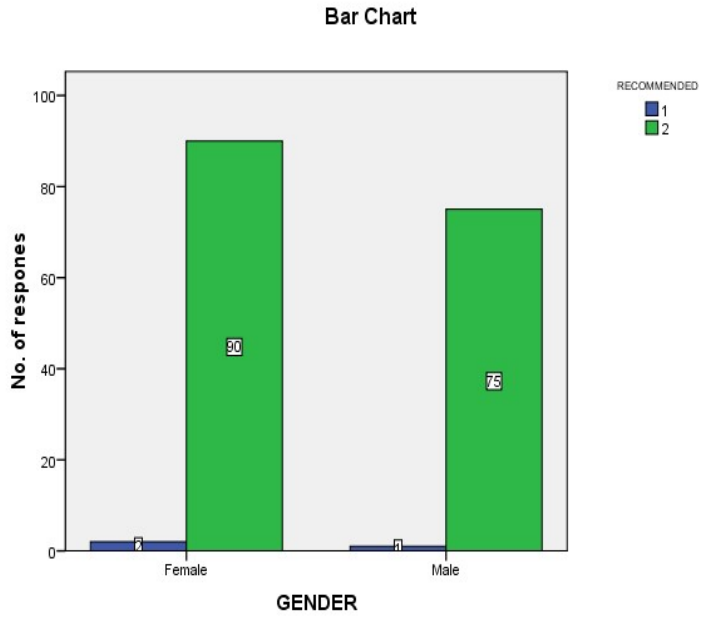

Figure 21: The bar chart represents the comparison of gender with frequency of brushing. X axis represents the gender and Y axis represents the number of responses. No (blue) Yes (green). Chi square analysis was done. Pearson chi-square value-1.845 and p value-0.174 (P>0.05), statistically not significant. Although statistically not significant, majority of females (90) brush twice a day when compared to males.

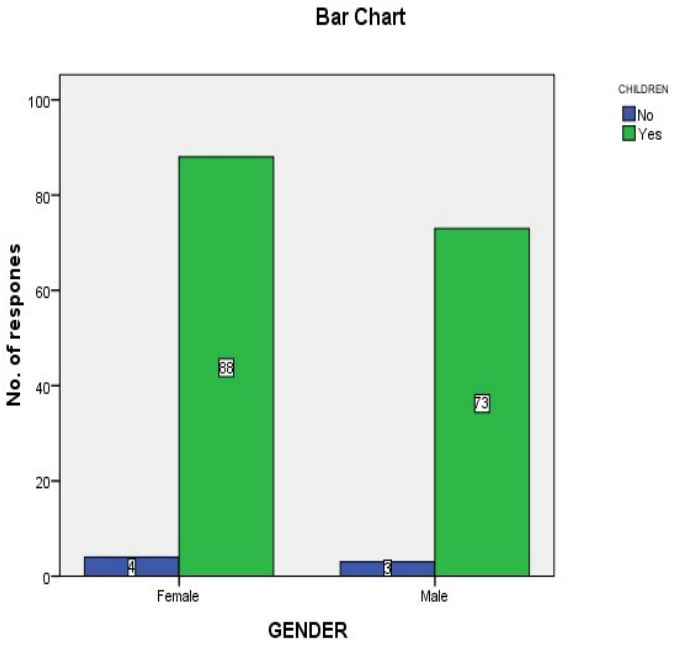

Figure 22: The bar chart represents the comparison between the gender and opinion on whether children eating fast food will have more dental caries. X axis represents the gender and Y axis represents the number of responses. No (blue) Yes (green). Chi square test was done. chi-square value- 0.064 and p value-0.800 (P>0.05), hence statistically not significant. Although statistically not significant, the majority of females(88%) are aware that children eating fast food are more prone to caries rather than males.

CONCLUSION

Within the limitations of this study the following conclusions can be drawn,

The student's knowledge levels are good regarding the dietary carbohydrates, but still there exists some lacunae. In this study there is no specific affiliation with gender and their knowledge on dietary carbohydrates and its cariogenic effects on early dental caries. This condition can be prevented by conducting educational camps which involve school-going children, so that strategies can be developed to prevent dental caries starting at an early age.

REFERENCES

[1] Gupta P, Gupta N, Pawar AP, Birajdar SS, Natt AS, Singh HP. Role of sugar and sugar substitutes in dental caries: a review. ISRN Dent. 2013 Dec 29;2013:519421.

[2] Moynihan P. Sugars and Dental Caries: Evidence for Setting a Recommended Threshold for Intake [Internet]. Vol. 7, Advances in Nutrition. 2016. p. 149–56. Available from: http://dx.doi.org/10.3945/an.115.009365

[3] Ariga P, Nallaswamy D, Jain AR, Ganapathy DM. Determination of Correlation of Width of Maxillary Anterior Teeth using Extraoral and Intraoral Factors in Indian Population: A Systematic Review [Internet]. Vol. 9, World Journal of Dentistry. 2018. p. 68–75. Available from: http://dx.doi.org/10.5005/jp-journals-10015-1509

[4] Lingstrom P, van Houte J, Kashket S. Food Starches and Dental Caries [Internet]. Vol. 11, Critical Reviews in Oral Biology & Medicine. 2000. p. 366–80. Available from: http://dx.doi.org/10.1177/10454411000110030601

[5] Jyothi S, Robin PK, Ganapathy D, Anandiselvaraj. Periodontal Health Status of Three Different Groups Wearing Temporary Partial Denture [Internet]. Vol. 10, Research Journal of Pharmacy and Technology. 2017. p. 4339. Available from: http://dx.doi.org/10.5958/0974-360x.2017.00795.8

[6] Leme AFP, Paes Leme AF, Koo H, Bellato CM, Bedi G, Cury JA. The Role of Sucrose in Cariogenic Dental Biofilm Formation—New Insight [Internet]. Vol. 85, Journal of Dental Research. 2006. p. 878–87. Available from: http://dx.doi.org/10.1177/154405910608501002

[7] Breda J, Jewell J, Keller A. The Importance of the World Health Organization Sugar Guidelines for Dental Health and Obesity Prevention [Internet]. Vol. 53, Caries Research. 2019. p. 149–52. Available from: http://dx.doi.org/10.1159/000491556

[8] Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments. Implant Dent. 2019 Jun;28(3):289–95.

[9] Selvan SR, Ganapathy D. Efficacy of fifth generation cephalosporins against methicillin-resistant Staphylococcus aureus-A review [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 1815. Available from: http://dx.doi.org/10.5958/0974-360x.2016.00369.3

[10] Broadbent JM, Thomson WM,

Poulton R. Trajectory Patterns of Dental Caries Experience in the Permanent Dentition to the Fourth Decade of Life [Internet]. Vol. 87, Journal of Dental Research. 2008. p. 69–72. Available from: http://dx.doi.org/10.1177/154405910808700112

[11] Ganapathy D, Sathyamoorthy A, Ranganathan H, Murthykumar K. Effect of Resin Bonded Luting Agents Influencing Marginal Discrepancy in All Ceramic Complete Veneer Crowns. J Clin Diagn Res. 2016 Dec;10(12):ZC67–70.

[12] Broadbent JM, Thomson WM, Poulton R. Progression of Dental Caries and Tooth Loss between the Third and Fourth Decades of Life: A Birth Cohort Study [Internet]. Vol. 40, Caries Research. 2006. p. 459–65. Available from: http://dx.doi.org/10.1159/000095643

[13] Subasree S, Murthykumar K, Dhanraj. Effect of Aloe Vera in Oral Health-A Review [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 609. Available from: http://dx.doi.org/10.5958/0974-360x.2016.00116.5

[14] Ranganathan H, Ganapathy DM, Jain AR. Cervical and Incisal Marginal Discrepancy in Ceramic Laminate Veneering Materials: A SEM Analysis. Contemp Clin Dent. 2017 Apr;8(2):272–8.

[15] Vijayalakshmi B, Ganapathy D. Medical management of cellulitis [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 2067. Available from: http://dx.doi.org/10.5958/0974-360x.2016.00422.4

[16] Chi DL, Hopkins S, O'Brien D, Mancl L, Orr E, Lenaker D. Association between added sugar intake and dental caries in Yup'ik children using a novel hair biomarker. BMC Oral Health. 2015 Oct 9;15(1):121.

[17] Jamel H, Plasschaert A, Sheiham A. Dental caries experience and availability of sugars in Iraqi children before and after the United Nations sanctions [Internet]. Vol. 54, International Dental Journal. 2004. p. 21–5. Available from: http://dx.doi.org/10.1111/j.1875-595x.2004.tb00248.x

[18] Ashok V, Suvitha S. Awareness of all ceramic restoration in rural population [Internet]. Vol. 9, Research Journal of Pharmacy and Technology. 2016. p. 1691. Available from: http://dx.doi.org/10.5958/0974-360x.2016.00340.1

[19] Chi DL, Scott JM. Added Sugar and Dental Caries in Children [Internet]. Vol. 63, Dental Clinics of North America. 2019. p. 17–33. Available from: http://dx.doi.org/10.1016/j.cden.2018.08.003

[20] Marshall TA. Nomenclature, characteristics, and dietary intakes of sugars [Internet]. Vol. 146, The Journal of the American Dental Association. 2015. p. 61–4. Available from: http://dx.doi.org/10.1016/j.adaj.2014.11.007

[21] Ashok V, Nallaswamy D, Benazir Begum S, Nesappan T. Lip Bumper Prosthesis for an Acromegaly Patient: A Clinical Report. J Indian Prosthodont Soc. 2014 Dec;14(Suppl 1):279–82.

[22] Sugar and caries [Internet]. Vol. 61, Dental Abstracts. 2016. p. 153. Available from: http://dx.doi.org/10.1016/j.denabs.2016.02.037

[23] Kannan A, Venugopalan S. A systematic review on the effect of use of impregnated retraction cords on gingiva [Internet]. Vol. 11, Research Journal of Pharmacy and Technology. 2018. p. 2121. Available from: http://dx.doi.org/10.5958/0974-360x.2018.00393.1

[24] Rawahi SHA, Al Rawahi SH, Asimakopoulou K, Newton JT. Theory based interventions for caries related sugar intake in adults: systematic review [Internet]. Vol. 5, BMC Psychology. 2017. Available from: http://dx.doi.org/10.1186/s40359-017-0194-z

[25] Ajay R, Suma K, Ali S, Sivakumar JK, Rakshagan V, Devaki V, *et al*. Effect of surface modifications on the retention of cement-retained implant crowns under fatigue loads: An In vitro study [Internet]. Vol. 9, Journal of Pharmacy And Bioallied Sciences. 2017. p. 154. Available from: http://dx.doi.org/10.4103/jpbs.jpbs_

146_17

[26] Moynihan PJ, Kelly SAM. Effect on Caries of Restricting Sugars Intake [Internet]. Vol. 93, Journal of Dental Research. 2014. p. 8–18. Available from: http://dx.doi.org/10.1177/00220345 13508954

[27] Ganapathy DM, Kannan A, Venugopalan S. Effect of Coated Surfaces influencing Screw Loosening in Implants: A Systematic Review and Meta-analysis [Internet]. Vol. 8, World Journal of Dentistry. 2017. p. 496–502. Available from: http://dx.doi.org/10.5005/jp-journals-10015-1493

[28] Venugopalan S, Ariga P, Aggarwal P, Viswanath A. Magnetically retained silicone facial prosthesis. Niger J Clin Pract. 2014 Mar;17(2):260–4.

[29] Basha FYS, Ganapathy D, Venugopalan S. Oral Hygiene Status among Pregnant Women [Internet]. Vol. 11, Research Journal of Pharmacy and Technology. 2018. p. 3099. Available from: http://dx.doi.org/10.5958/0974-360x.2018.00569.3

[30] Riolina A, Hartini S, Suparyati S. Dental and oral health problems in elementary school children: A scoping review [Internet]. Pediatric Dental Journal. 2020. Available from: http://dx.doi.org/10.1016/j.pdj.2020.04.001