Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 5, June 2021: 1579 - 1594

A questionnaire survey to assess the knowledge of dental Students on oral habits and its ill effects

Fathima Bareera Rezvi
Saveetha Dental College and Hospitals
Saveetha Institute of Medical and Technical Sciences
Saveetha University,
Chennai, India
151501061.sdc@saveetha.com

Geo Mani
Reader
Department of Pedodontics and Preventive Dentistry
Saveetha Dental College and Hospitals,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University
Chennai, India
Email id: geomani.sdc@saveetha.com

ABSTRACT

Oral habits are patterns of muscle contraction and have a very complex nature. These habits can cause damage to dentoalveolar structure; hence, dentists play an important role in providing necessary information to parents. The aim of the present study is to determine the knowledge of dentists on various oral habits and its ill effects on children. Questionnaire with 20 questions was prepared and the survey was conducted among 103 dental practitioners. The responses were statistically analyzed through SPSS software. Descriptive statistics were done. Chi square test was done with a p value <0.05 considered statistically significant. Many were aware about most of the habits, whereas frenum thrusting and bobby pin opening were known by a few. 74.8% were aware of the difference between mouth breathers and nasal breathers. More than 48.5% were aware of the consequences of thumb sucking. This study shows that the knowledge of dental students on oral habits and its ill effects was not satisfactory and measures need to be instilled to create awareness about the same. No significant association between the responses of practitioners based on year of study was noticed (p=0.529)

Key Words: Oral habits; Ill effects; Thumb sucking; Dentoalveolar, Children, Dentists

INTRODUCTION

A habit is an inclination or aptitude for some action acquired by frequent repetition, showing itself in increased facility to performance and reduced power of resistance (Neilson, 1934). Several studies have evaluated its etiological factors and suggest that fatigue, boredom, excitement, hunger, fear, physical and emotional stress, and insufficient satisfaction of sucking need in infancy are situations that could stimulate different habits. These habits may provide happiness and a sense of security when a child faces difficult times (Al-Jobair and Al-Emran, 2004) (Salah, 2007). It may also give a feeling of warmth and contentment (Turgeon-O'Brien *et al.*, 1996). These habits are one of the most frequent factors identified by orthodontists that affect the normal growth and development of muscles and jaw bones during childhood and adolescence (Frazão *et al.*, 2002).

Oral function consists of articulation, swallowing and chewing. Malocclusion may be caused by abnormal functions such as mouth-breathing, tongue thrusting, swallowing and unilateral chewing and by abnormal postures of oro-circumferential muscles such as forward tongue thrust, tongue biting, and low tongue at rest. Forces from unilateral and habitual behaviours constantly acting on the maxillofacial and alveolar regions can cause the bony structures to generally deform, resulting in jaw deformity and malocclusion (Yamaguchi and Sueishi, 2003). Malocclusion, as a major oral health problem, takes the second place among most common dental disorders of children and young adults after dental caries (Ravichandran, 2017). Malocclusion is frequent in the populations, irrespective of geographical area, ethnic group, gender, age, or social class and has been of a morphological

variation and not pathological conditions (Rodríguez, Casasa Araujo and Natera, 2007). These harmful oral habits represent the primary cause for malocclusion. They produce an imbalance between the intra and extra oral musculature. The repercussions depend on the age of the subject and also the frequency and intensity with which they occur.

Sucking habits inhibit growth of the mandible, producing not only upper protrusion and spacing but also lingualization of the lower teeth. It also increases the risk for gastrointestinal disease (Ramesh, Guruanthan and Karthikeyan, 2016). As teeth erupt and get in contact with all the relations already established, visible and transitory or permanent alterations start to appear. These alterations end up causing bone and muscle disorders and malocclusion in children (Lowe and Johnston, 1979).

Tongue thrust swallowing is abnormal after the age of five, causing open bite, spacing and protrusion, labial incompetence and phonetic disorders (Ramesh, Guruanthan and Karthikeyan, 2016). Tongue thrust swallowing causes labial incompetence, thus causes mouth breathing. It induces open bite and protrusion of the upper incisors (Dixit and Shetty, 2013). Effects on the lower incisors are reduced (Gellin, 1978). It may be associated with narrow maxilla, deep palate and II / 1 Angle class disorder (Motta *et al.*, 2011). According to existing studies, the prevalence of swallowing with tongue interposition decreases with age (Garde *et al.*, 2014). Habitual mouth breathing occurs as a consequence of childhood practices such as tongue thrust swallowing, aspiration of the lower lip, or digit sucking (Ramesh, Guruanthan and Karthikeyan, 2016). Oral breathing may be a consequence of nasal obstruction by hypertrophied tonsils, asthma, polyps or tumours which force substitution of the nasal passage with the oral way (Ramesh, Guruanthan and Karthikeyan, 2016). There is a close association between mouth breathing and the presence of oral halitosis (Mistry *et al.*, 2010). Lower lip aspiration determines an increase of the over jet, hypertonicity of the lower lip and inhibits normal growth of the mandible (Ramesh, Guruanthan and Karthikeyan, 2016).

When considering the etiology of malocclusion, most textbooks list the possible factors without providing a working hypothesis with which to balance their clinical relevance. Congenital defects and trauma are always listed, but are generally accepted as responsible for <5% of malocclusions. The influence of muscle activity, posture, and various deleterious habits are usually included, but listed under local factors and little guidance is given about the extent of their impact or how they can be assessed. Without a clear understanding of the etiology of any condition, there is a risk that treatment becomes empirical or symptomatic. A synergistic influence of the combination of high caries rate in deciduous dentition and coexistence of deleterious oral habits is commonly seen (Cozza *et al.*, 2007) (Warren *et al.*, 2005) (Cozza *et al.*, 2005) (Tausche, Luck and Harzer, 2004) (Goel, Sequeira and Peter, 2000)

It is important for dentists to enhance their knowledge on oral habits and its ill effects, practising clinician they should be able differentiate between habits that are acceptable from the habits that are unacceptable. This will help the dentist instill a positive attitude and behaviour towards the patients, introduce and implement principles of preventive dentistry from birth including parental guidance and counseling. It also enables the dentist for early diagnosis and treatment.

Although a number of studies correlating deleterious oral habits and their effects on mixed dentition have been documented with the incidence ranging from 33.37% to 55%, (Cozza *et al.*, 2007) (Warren *et al.*, 2005) (Cozza *et al.*, 2005) (Tausche, Luck and Harzer, 2004) the literature with regard to the effect of deleterious oral habits on deciduous dentition is sparse.

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugaavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018; Nair *et al.*, 2018; Ravikumar *et al.*, 2018, 2019; Ravindra *et al.*, 2018, 2019; Subramanyam *et al.*, 2018; Vishnu Prasad *et al.*, 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal, Jeevanandan and Subramanian, 2019; Vignesh *et al.*, 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research to assess the knowledge of dentists on deleterious oral habits and malocclusions in pediatric patients. Previously our team has a rich experience in working on various research projects across multiple disciplines The (Somasundaram *et al.*, 2015; Hafeez and Others, 2016; Krishnan *et al.*, 2018)(Choudhari and Thenmozhi, 2016; Dhinesh *et al.*, 2016; Gurunathan and Shanmugaavel, 2016; Sneha and Others, 2016; GovinDaraju and Gurunathan, 2017; Kumar and Rahman, 2017; Felicita and Sumathi Felicita, 2018; Saravanan *et al.*, 2018; Vijayakumar Jain *et al.*, 2019; Wu *et al.*, 2019; Palati *et al.*, 2020; Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020).

MATERIALS AND METHODS

An online survey was conducted among 103 dental practitioners to determine the knowledge of dentists on various oral habits and its ill effects on children. The questionnaire was distributed to 3rd years, 4th years and interns of University dental hospital. A convenience sample was taken and the questionnaire was distributed on an online platform. The validity and reliability of the questionnaire was assessed by experts in the field. Also a pilot study was conducted to evaluate the same. This online questionnaire survey consisted of 20 questions that were distributed to the study population through google forms. This questionnaire comprises questions based on different types of oral habits prevalent in children such as digit sucking, lip habits, tongue thrusting, mouth breathing, nail biting, frenum thrusting and their management. The questionnaire was assessed by experts in the field for validity and reliability. The questionnaire validity checking was done through standard manner. Descriptive statistics were done,percentages and frequencies were calculated and to test difference among variables chi square test was done with a p value <.05 considered statistically significant. Data Analytics Data was entered into a spreadsheet using Microsoft Excel. The data which was collected was analyzed using Statistical Package for Social Sciences for Windows, version 20.0 (SPSS Inc., Chicago, IL, USA). The data were assessed by being subjected to descriptive analysis with the help of frequencies, percentages. The data was represented by the means of bar graphs. Chi-square test was used and results were correlated and associated.

RESULTS AND DISCUSSION

The study was conducted among 103 members. Among the participants, 78 (75.7%) were females and 25 (24.3%) were males. 25.2% were students of 3rd year, 23.3% were students of 4th year and 51.5% were interns. Out of 103 participants, more than 50% were aware about thumb habits, lip habits, bruxism, tongue thrusting, mouth breathing, nail biting and cheek biting whereas frenum thrusting and bobby pin opening were known only by 4.9% and 7.8% respectively. The above results were similar to the study conducted by (Basra *et al.*, 2016) in which less than 20% reported about the following habits such as bruxism, mouth breathing , digital sucking, nail biting , lip biting and tongue thrusting. Our survey showed that mouth breathing was known by most of the participants and this is similar to the studies conducted by (Basra *et al.*, 2016) (Guaba *et al.*, 1998) (Kharbanda, 2009), whereas according to (Quashie-Williams, Dacosta and Isiekwe, 2007) thumb sucking was most prevalent.

When questioned about whether thumb sucking during the eruption of permanent maxillary incisors damage the dento alveolar structures, 90.3% answered yes and 9.7% answered no. When the same question was asked before the eruption of permanent maxillary incisors, 78.6% said yes and 21.4% said no. Almost 60% stated that stress, working mother, food habits are the etiological factors of thumb sucking, while approximately 40% stated that socio economic status, number of siblings and birth order of the child are the etiological factors. A study by Jahanbin et al. stated that child's birth rank and number of siblings and parents' educational level were significantly related to thumb sucking habit, which is not in favour of our study results (Jahanbin, Mokhber and Jabbarimani, 2010). When questioned about the effect of thumb sucking on mandible, almost 36% said Proclination of mandibular incisors, 49% said retroclination of mandibular incisors, 12.6% said maxilla is more distally placed and 2.9% said mandible is more distally placed.

Almost 44% stated appliance therapy as a management technique for thumb sucking, whereas 27% and 4% stated that counseling, psychological approach and medications respectively. A survey conducted by (Kumar, Shivanna and Kopuri, 2019) reported that 8% opted for counseling the child, 7% pointed out counseling the parent, and 4% expressed referring to the dentist, which does not agree with our study. The same was asked for lip habits and 21.4% said fixed appliance, 32% said removable appliance and 47% said lip bumper. When asked about other names for bruxism, 56% said tooth grinding, 38% said night grinding and only 6% said lisping. Most of the participants were not aware as to when bruxism occurred. 38% said stage 2 of NREM sleep, 51% said stage 3 of NREM sleep and 12% said stage 4 of NREM sleep. When questioned about tongue thrusting, 30% said tongue tip between incisors while swallowing, 35% said tongue tip behind the incisors while swallowing, 23% said tongue tip between incisors while breathing and 12% said tongue tip behind incisors while breathing.

When asked about the difference between mouth breathers and nasal breathers, only 75% stated that mouth breather's lips will be apart and nasal breather's lips will be touching, whereas 12% said that mouth breather's lips will be touching. 60% answered that mirror test (fog test) is used to diagnose mouth breathers and 43% stated that onychophagia is commonly known as nail biting. A study conducted by (Pacheco *et al.*, 2015) is similar to our study in which 57% have respnded mirror tests to be used for diagnosis of mouth breathers. 39% stated that frenum thrusting is mostly seen in children with midline diastema. When questioned about what does bobby pin opening habit lead to, only 36% were aware that it is notched incisors.

82% said that dentists have an important role in counseling patients regarding their oral habits and 61% said they have done counseling for their patients. 86% said they were able to detect cases of malocclusion that are caused due to oral habits. 88% stated that they have made efforts to eliminate the cause of these oral habits. When questioned about the gender predilection of oral habits, 27% said more in boys, 25% said more in girls, 38% said equal predilection and 13% said no predilection, but (Stefănescu, Zetu and Rusu, 2011) stated that most respondents reported female predilection, which is not in agreement with our study.

Dentists have the responsibility to recognize, diagnose, and manage or refer abnormalities in the developing dentition (Majorana *et al.*, 2008). Most of the etiologic factors of malocclusion are of genetic origin and hence cannot be prevented, but environmental factors may be the focus of attention. In this context, the early interception of oral habits may be vital in preventing occlusal disturbances (Woodside, 2000).

Habit	Frequency	Percent
Bobby pin opening	8	7.8
Bruxism	13	12.6
Cheek biting	13	12.6
Frenum thrusting	5	4.9
Lip habits	11	10.7
Mouth breathing	14	13.6
Nail biting	14	13.6
Thumb habits	12	11.7
Tongue thrusting	13	12.6
Total	103	100

Table 1 This table represents the students' response to the following questions and the percentage of respondents. 7.8% responded that they were aware of the habit bobby pin opening, while 12.6% were of bruxism, 12.6% were aware of cheek biting, 4.9% were aware of frenum thrusting, 10.7% were aware of lip habits, 13.6% were aware of mouth breathing, 13.6% were aware of nail biting, 11.7% were aware of thumb habits and 12.6% were aware of tongue thrusting habits. Very few were aware of frenum thrusting and bobby pin opening habits.

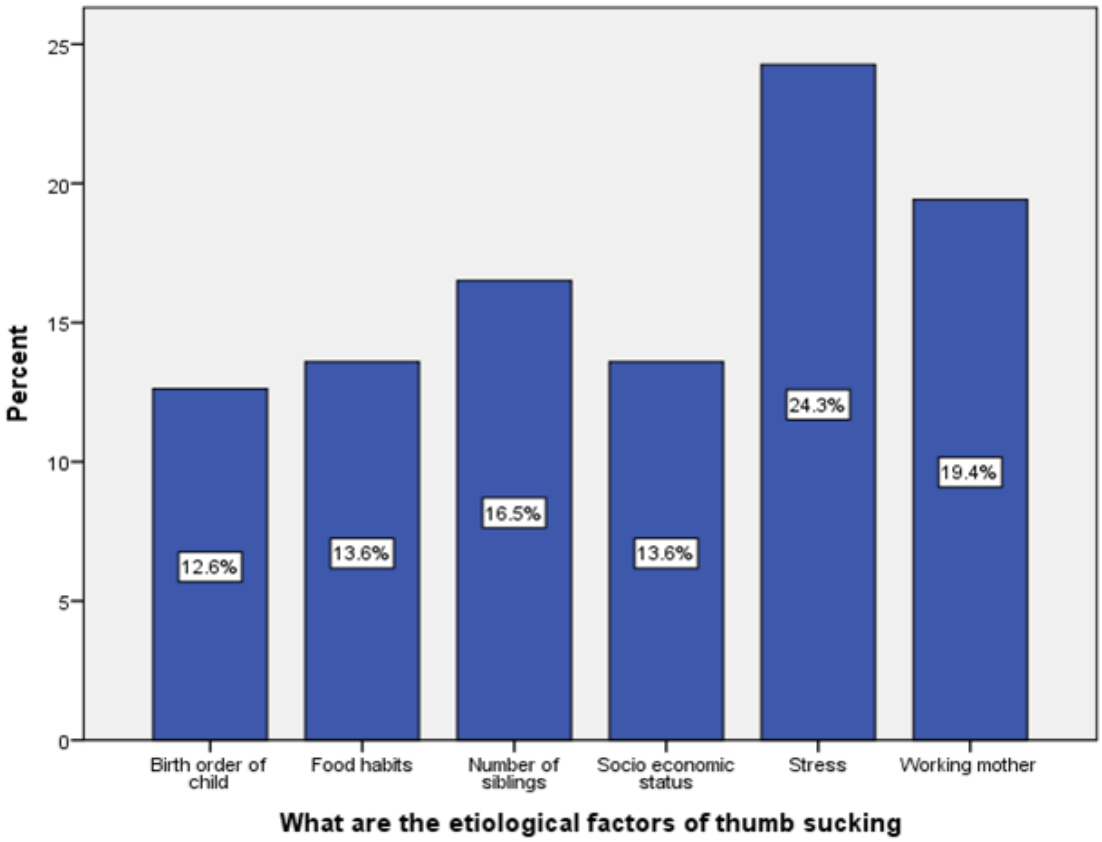

Figure 1 The bar graph represents the students' response to what are the etiological factors of thumb sucking. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Stress 24.3%, working mother 19.4%, number of siblings 16.5%, socio-economic status and food habits 13.6% and birth order of child 12.6%

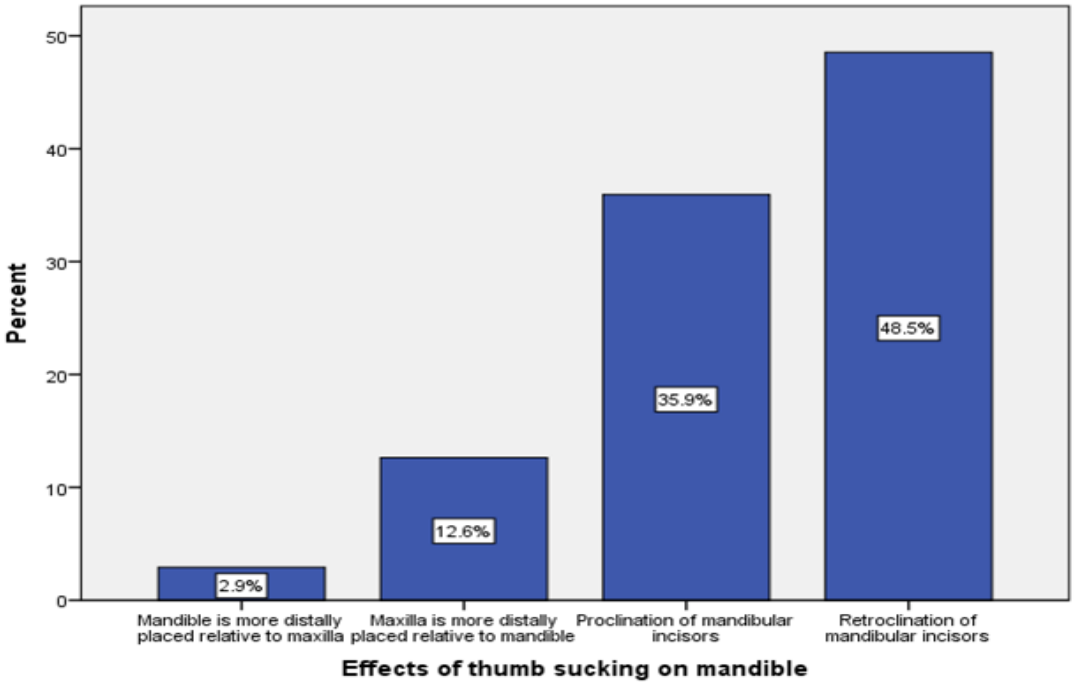

Figure 2 The bar graph represents the students' response to effects of thumb sucking n mandible. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows -

Retroclination of mandibular incisors 48.5%, proclination of mandibular incisors 35.9%, maxilla is more distally placed relative to mandible 12.6% and mandible is more distally placed relative to maxilla 2.9%.

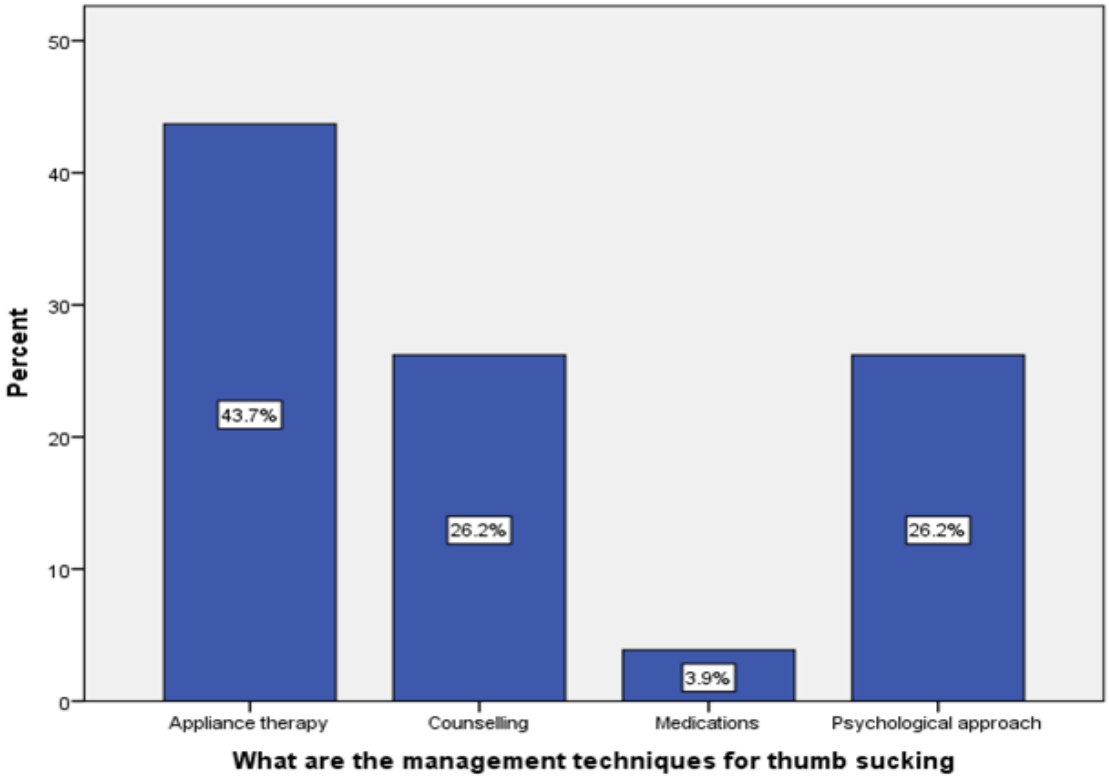

Figure 3 The bar graph represents the students' response to what are the management techniques for thumb sucking. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Appliance therapy 43.7%, counselling and psychological approach 26.2% and medication 3.9%.

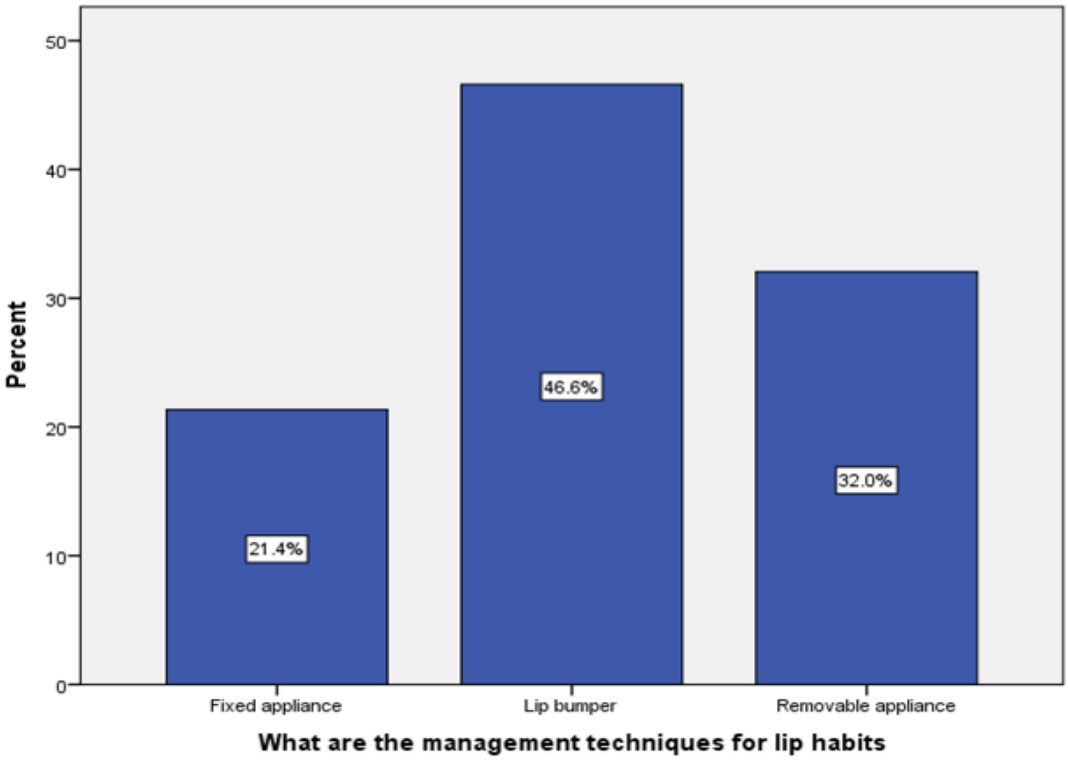

Figure 4 The bar graph represents the students' response to what are the management techniques for lip habits. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Lip bumper 46.6%, removable appliance 32.0% and fixed appliance 21.4%.

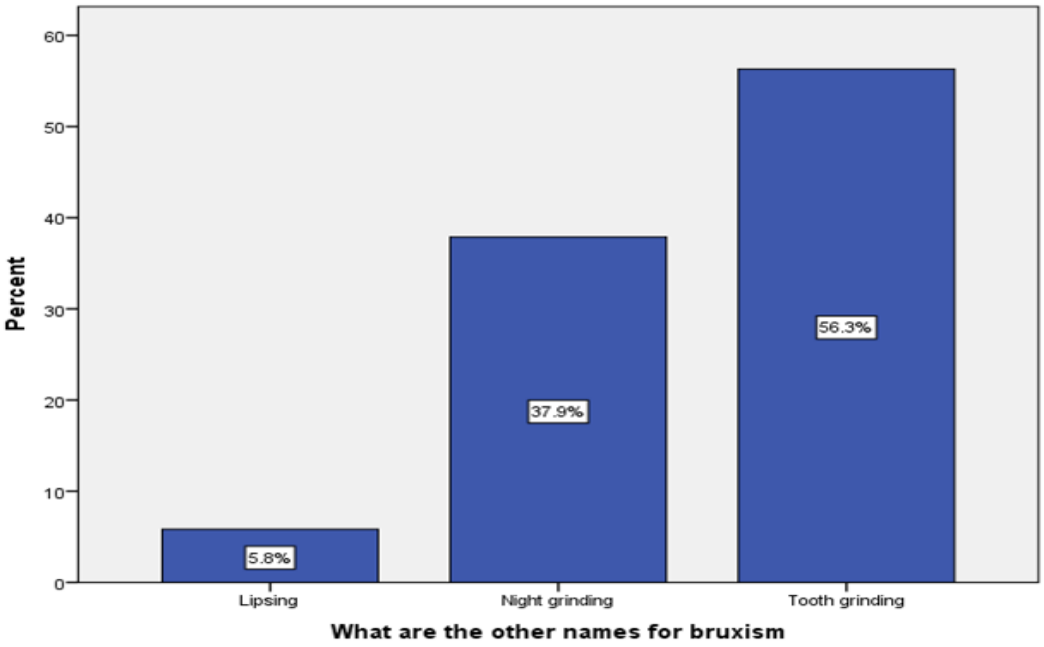

Figure 5 The bar graph represents the students' response to what are the other names for bruxism. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Tooth grinding 56.3%, night grinding 37.9% and lipsing 5.8%.

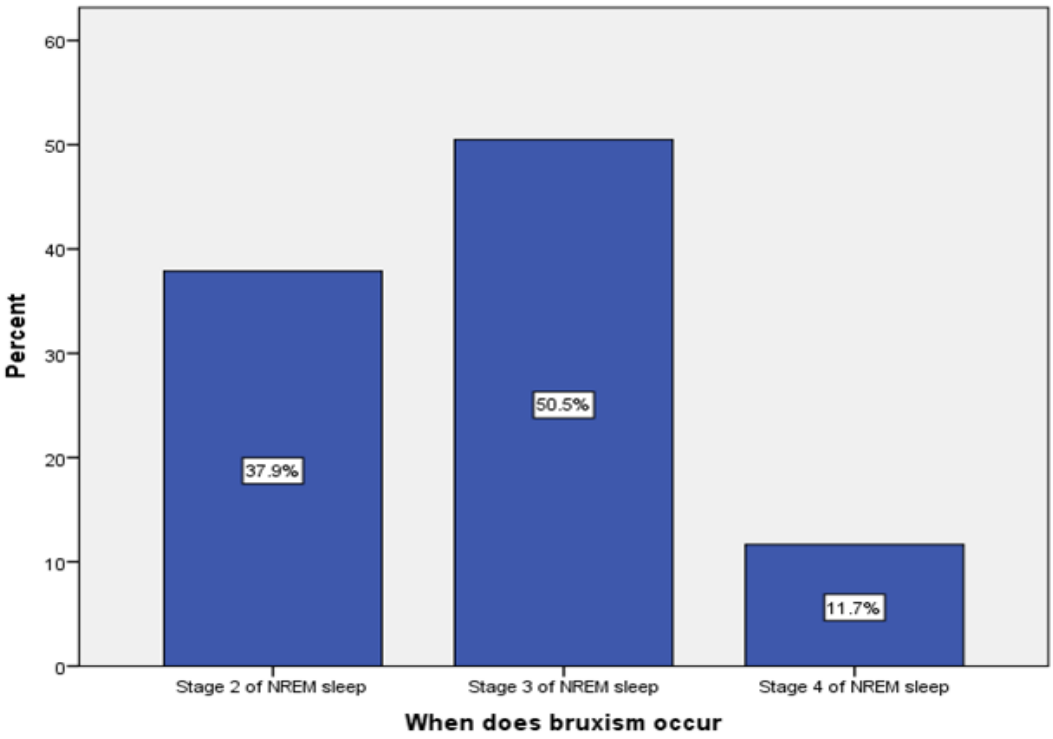

Figure 6 The bar graph represents the students' response to when does bruxism occur. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Stage 3 of NREM sleep 50.5%, Stage 2 of NREM sleep 37.9% and Stage 4 of NREM sleep 11.7%.

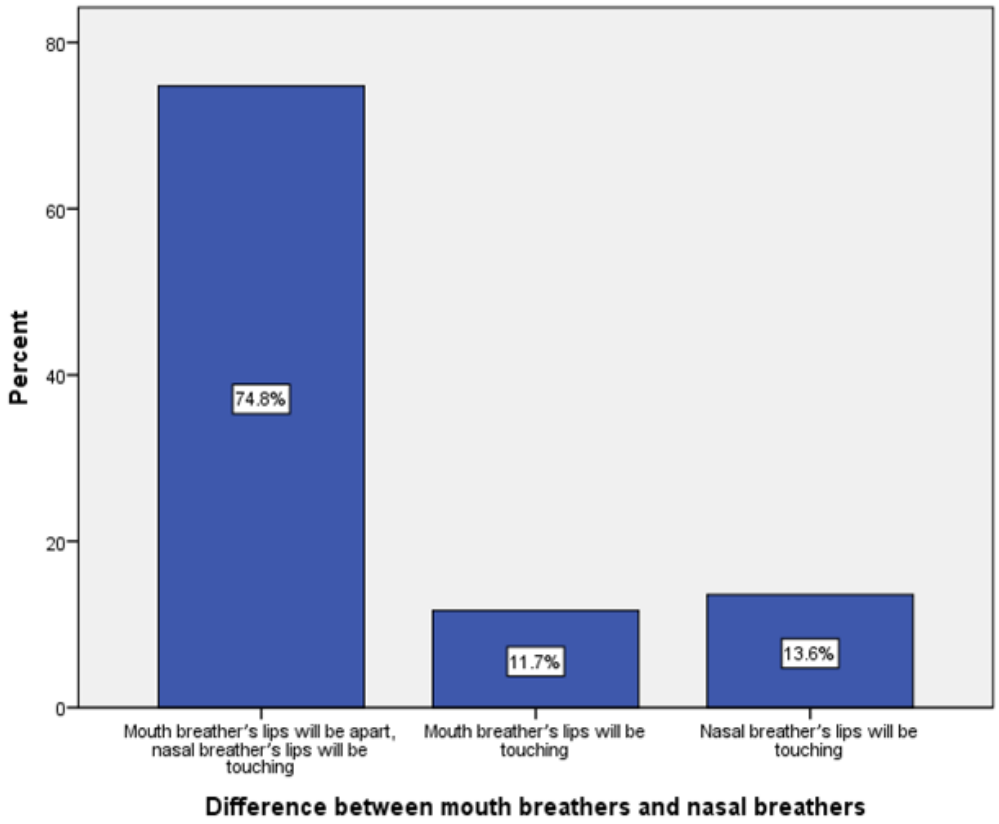

Figure 7 The bar graph represents the students' response to difference between mouth breathers and nasal breathers. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Mouth breather's lips will be apart, nasal breather's lips will be touching 74.8%, Mouth breather's lips will be touching 11.7% and nasal breather's lips will be touching 13.6%.

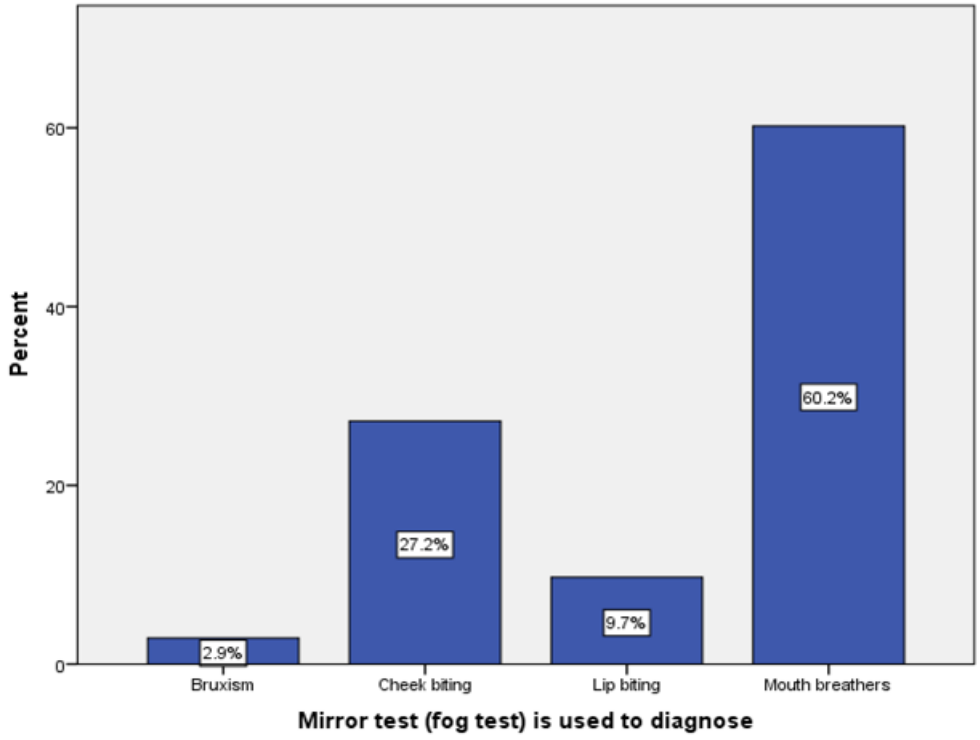

Figure 8 The bar graph represents the students' response to mirror test used to diagnose mouth breathing habit. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Mouth breathers 60.2%, cheek biting 27.2%, Lip biting 9.7% and bruxism 2.9%.

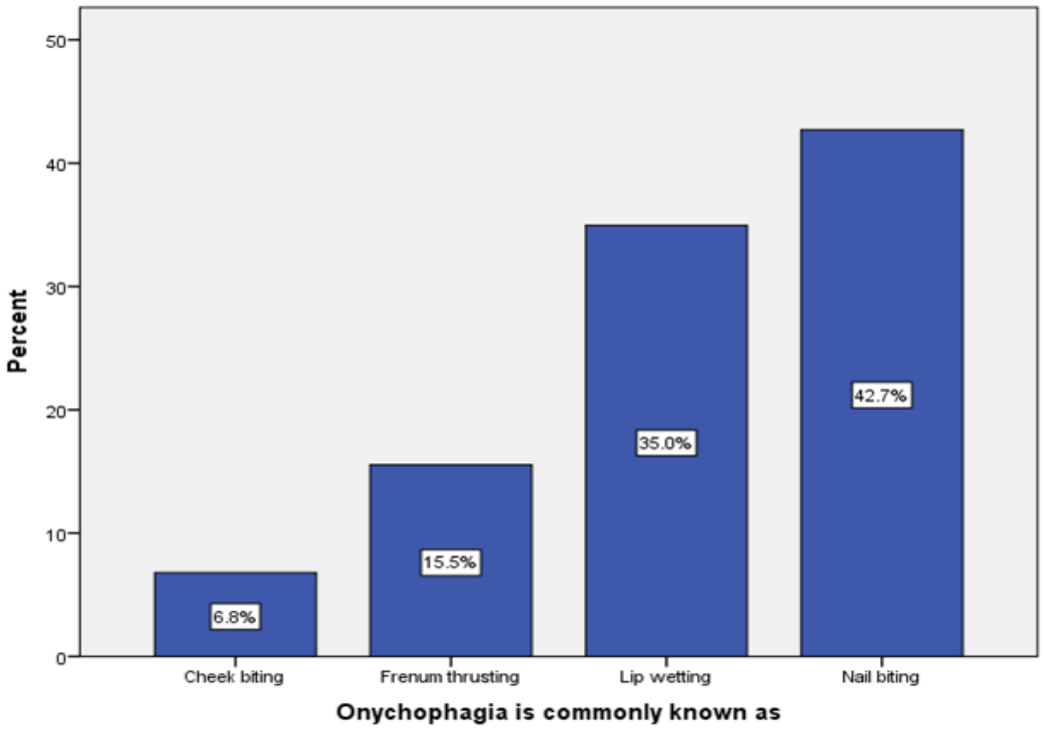

Figure 9 The bar graph represents the students' response to onychophagia is commonly known as. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Nail biting 42.7%, lip wetting 35.0%, frenum thrusting 15.5% and cheek biting 6.8%.

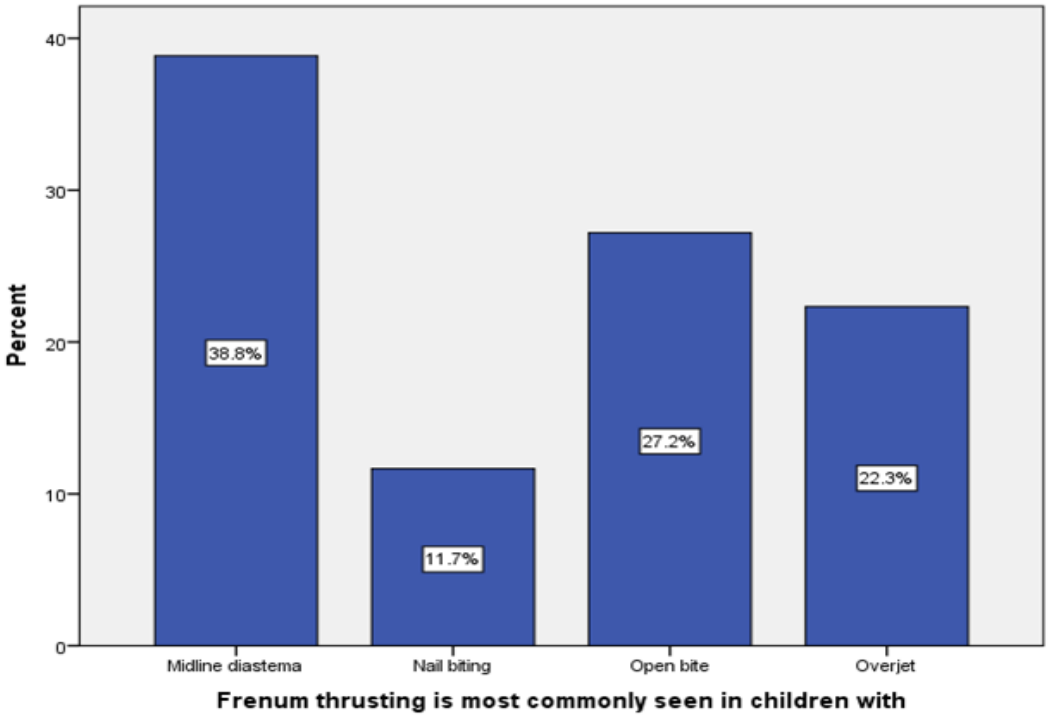

Figure 10 The bar graph represents the students' response to onychophagia is commonly known as. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Nail biting 42.7%, lip wetting 35.0%, frenum thrusting 15.5% and cheek biting 6.8%.

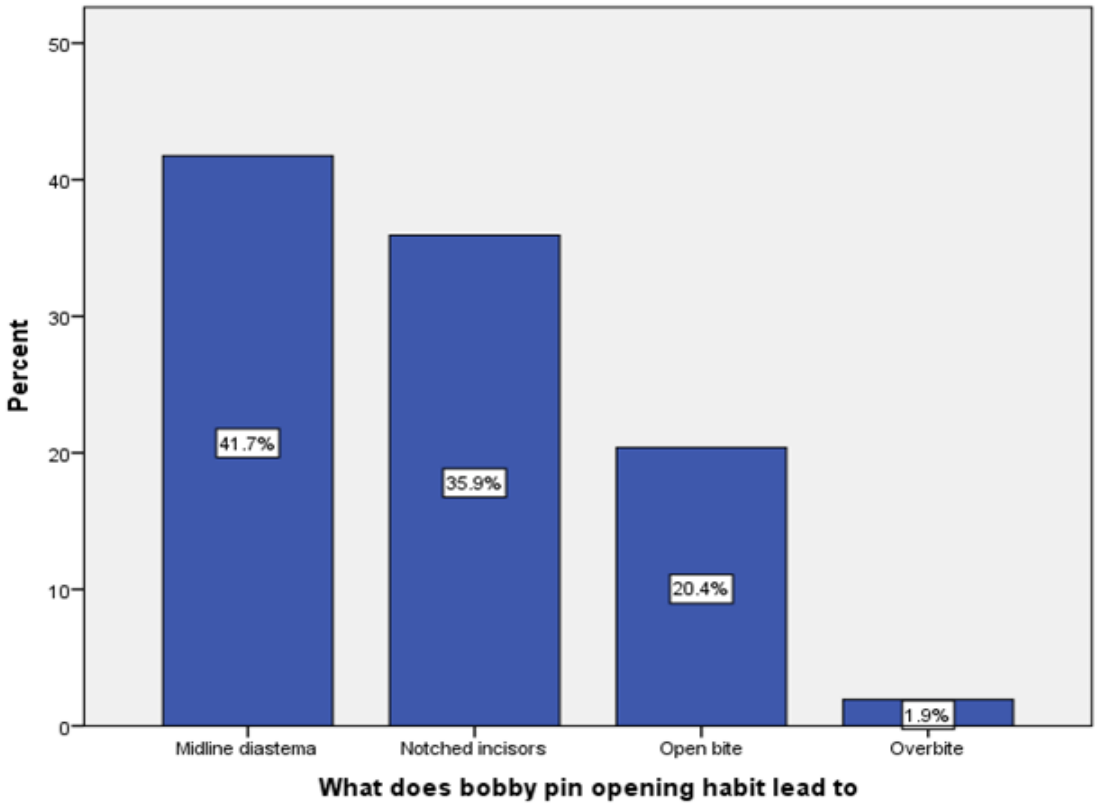

Figure 11 The bar graph represents the students' response to what does bobby pin opening habit lead to. The X-axis represents the various responses and Y-axis denotes the percentage of respondents. Responses were as follows - Midline diastema 41.7%, notched incisors 35.9%, open bite 20.4% and overbite 6.8%.

Questions	Yes	No
1. Do you think dentists have an important role in counseling patients regarding their oral habits	82 (79.6%)	21 (20.4%)
2. As a dentist, are you able to detect cases of malocclusion that are caused due to oral habits	86 (83.5%)	17 (16.5%)
3. As a dentist, have you made an effort to eliminate the cause of these oral habits	88 (85.4%)	15 (14.6%)
4. Have you done counseling for any of your patients	61 (59.2%)	42 (40.8%)

Table 2 This table represents the students' response to the following questions and the percentage of respondents. When questioned if they think dentists have an important role in counselling patients, 79.6% said yes and 20.4% said no. When questioned as a dentist, are you able to detect cases of malocclusion that are caused due to oral habits, 83.5% said yes and 16.5% said no. When questioned as a dentist, have you made an effort to eliminate the

cause of these oral habits, 85.4% said yes and 14.6% said no. When questioned have you done counseling for any of your patients, 59.2% said yes and 40.8% said no.

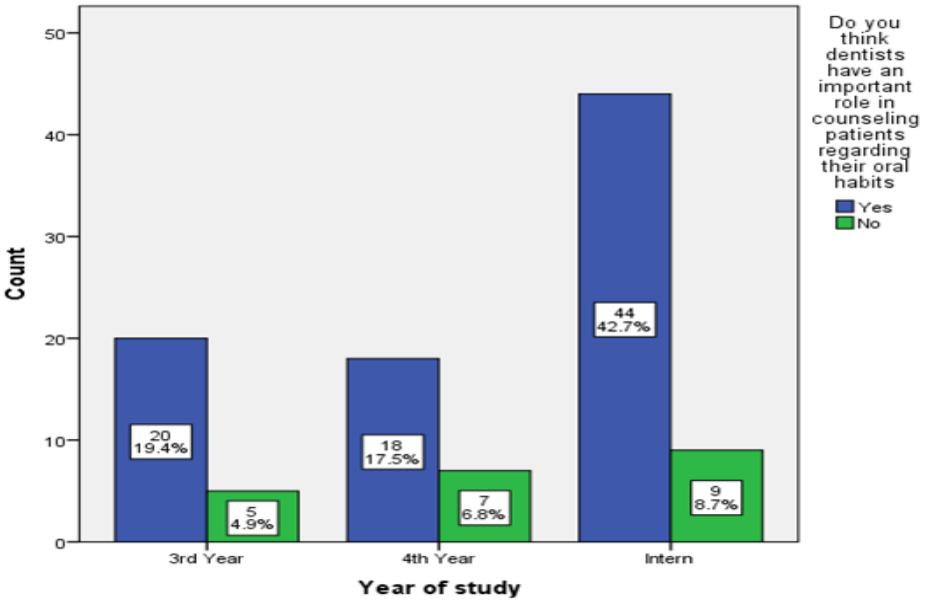

Figure 12 bar graph represents the association between dental practitioners' response over the importance of dentists' role in counselling patients regarding their oral habits. X-axis represents the year of study of the participants and y-axis represents the dental practitioner's response. Blue color represents response- 'yes' and green color represents -'no'. Chi square test was performed and p value of 0.529 was obtained (p value >0.05) showing no significant association between the responses of practitioners based on year of study.

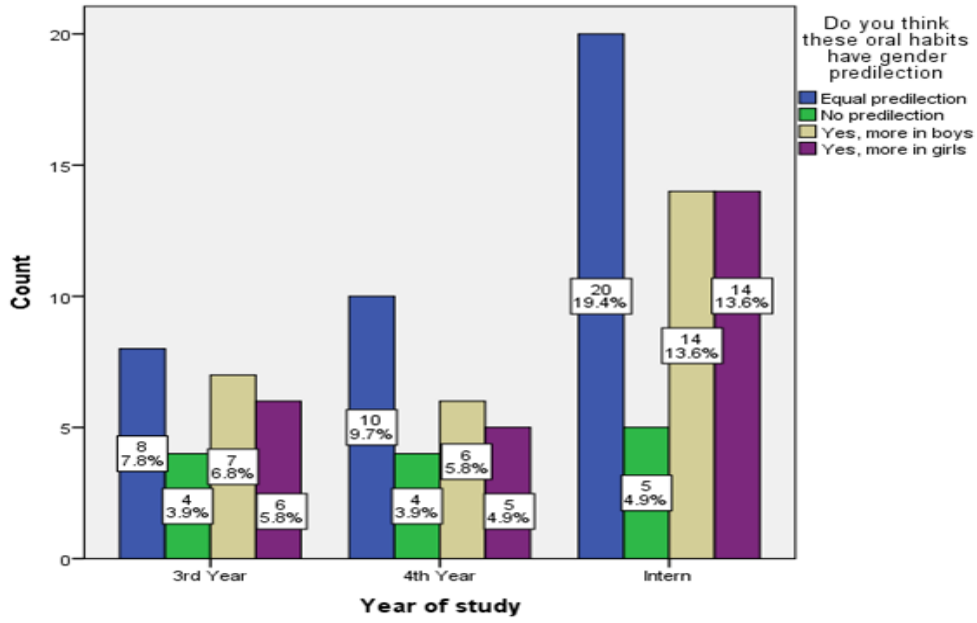

Figure 13 bar graph represents the association between dental practitioners' response over do you think oral habits have gender predilection. X-axis represents the year of study of the participants and y-axis represents the dental practitioner's response. Blue color represents response- 'equal predilection', green color represents -'no

predilection', gray colour represents - 'yes,more in boys' and purple colour represents - yes,more in girls. Chi square test was performed and p value of 0.961 was obtained (p value >0.05) showing no significant association between the responses of practitioners based on year of study.

The findings of our study showed that the awareness among students was not satisfactory. There was no significant association found between the responses of the students based on the years of study. More awareness should be created as dentists have the responsibility to recognize, diagnose, and manage or refer abnormalities in the developing dentition, while early interception of oral habits may be vital in preventing occlusal disturbances. Limitations of this survey was that a convenience sample was chosen, limited sample size, online platform for conducting the survey than direct interviews. The future scope could be to educate more students on oral habits and its ill effects.Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)**.**

CONCLUSION

Within the limits of this study it was seen that the knowledge of dentists on oral habits and its ill effects was not satisfactory. No significant association was found between the responses of practitioners based on year of study (p value >0.05) While most students were aware of the habits, their knowledge about the habits seems to be inadequate and measures need to be instilled to create awareness about the same.

ACKNOWLEDGEMENT

The authors of this study would like to express their gratitude towards everyone who facilitated and enabled us to carry out this study successfully.

AUTHOR'S CONTRIBUTION

First author (Fathima Bareera Rezvi) performed the analysis, and interpretation and wrote the manuscript. Second author (Dr. Geo Mani) contributed to conception, data design analysis, interpretation and critically revised the manuscript. Both the authors have discussed the results and contributed to the final manuscript.

CONFLICT OF INTEREST

Nil

REFERENCES

1. Al-Jobair, A. and Al-Emran, S. E. S. (2004) 'Attitudes of Saudi Arabian mothers towards the digit-sucking habit in children', *International journal of paediatric dentistry / the British Paedodontic Society [and] the International Association of Dentistry for Children*, 14(5), pp. 347–354.
2. Basra, A. S. *et al.* (2016) 'Deleterious Oral Habits among School Going Children - A Cross-Sectional Study', *JBR Journal of Interdisciplinary Medicine and Dental Science*. doi: 10.4172/2376-032x.1000206.
3. Chandrasekar, R. *et al.* (2020) 'Development and validation of a formula for objective assessment of cervical vertebral bone age', *Progress in orthodontics*, 21(1), p. 38.
4. Choudhari, S. and Thenmozhi, M. S. (2016) 'Occurrence and Importance of Posterior Condylar Foramen', *Laterality*, 8, pp. 11–43.
5. Cozza, P. *et al.* (2005) 'Sucking habits and facial hyperdivergency as risk factors for anterior open bite in the mixed dentition', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*, 128(4), pp. 517–519.
6. Cozza, P. *et al.* (2007) 'Transverse features of subjects with sucking habits and facial hyperdivergency in the mixed dentition', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*, 132(2), pp. 226–229.
7. Dhinesh, B. *et al.* (2016) 'An assessment on performance, emission and combustion characteristics of single cylinder diesel engine powered by Cymbopogon flexuosus biofuel', *Energy Conversion & Management*, 117, pp. 466–474.

8. Dixit, U. B. and Shetty, R. M. (2013) 'Comparison of soft-tissue, dental, and skeletal characteristics in children with and without tongue thrusting habit', *Contemporary clinical dentistry*, 4(1), pp. 2–6.
9. Ezhilarasan, D., Apoorva, V. S. and Ashok Vardhan, N. (2019) 'Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells', *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*, 48(2), pp. 115–121.
10. Felicita, A. S. and Sumathi Felicita, A. (2018) 'Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor – The sling shot method', *The Saudi Dental Journal*, pp. 265–269. doi: 10.1016/j.sdentj.2018.05.001.
11. Frazão, P. *et al.* (2002) 'Malocclusion prevalence in the deciduous and permanent dentition of schoolchildren in the city of São Paulo, Brazil, 1996', *Cadernos de Saúde Pública*, 18(5), pp. 1197–1205.
12. Garde, J. B. *et al.* (2014) 'An epidemiological study to know the prevalence of deleterious oral habits among 6 to 12 year old children', *Journal of international oral health : JIOH*, 6(1), pp. 39–43.
13. Gellin, M. E. (1978) 'Digital sucking and tongue thrusting in children', *Dental clinics of North America*, 22(4), pp. 603–619.
14. Goel, P., Sequeira, P. and Peter, S. (2000) 'Prevalence of dental disease amongst 5-6 and 12-13 year old school children of Puttur municipality, Karnataka State-India', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 18(1), pp. 11–17.
15. GovinDaraju, L. and Gurunathan, D. (2017) 'Effectiveness of Chewable Tooth Brush in Children-A Prospective Clinical Study', *Journal of clinical and diagnostic research: JCDR*, 11(3), p. ZC31.
16. Govindaraju, L., Jeevanandan, G. and Subramanian, E. M. G. (2017a) 'Comparison of quality of obturation and instrumentation time using hand files and two rotary file systems in primary molars: A single-blinded randomized controlled trial', *European journal of dentistry*, 11(3), pp. 376–379.
17. Govindaraju, L., Jeevanandan, G. and Subramanian, E. M. G. (2017b) 'Knowledge and practice of rotary instrumentation in primary teeth among indian dentists: A questionnaire survey', *Journal of International Oral Health*, 9(2), p. 45.
18. Guaba, K. *et al.* (1998) 'Prevalence of malocclusion and abnormal oral habits in North Indian rural children', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 16(1), pp. 26–30.
19. Gurunathan, D. and Shanmugaavel, A. K. (2016) 'Dental neglect among children in Chennai', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 34(4), p. 364.
20. Hafeez, N. and Others (2016) 'Accessory foramen in the middle cranial fossa', *Research Journal of Pharmacy and Technology*, 9(11), p. 1880.
21. Jahanbin, A., Mokhber, N. and Jabbarimani, A. (2010) 'Association between sociodemographic factors and nutritive and non-nutritive sucking habits among Iranian girls', *Eastern Mediterranean Health Journal*, pp. 1143–1147. doi: 10.26719/2010.16.11.1143.
22. Jeevanandan, G., Ganesh, S. and Arthilakshmi (2019) 'Kedo file system for root canal preparation in primary teeth', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 30(4), pp. 622–624.
23. Jeevanandan, G. and Govindaraju, L. (2018) 'Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded randomised clinical trial', *European archives of paediatric dentistry: official journal of the European Academy of Paediatric Dentistry*, 19(4), pp. 273–278.
24. Kharbanda (2009) *Orthodontics: Diagnosis and Management of Malocclusion and Dentofacial Deformities*. Elsevier India Pvt. Limited.
25. Krishnan, R. P. *et al.* (2018) 'Surgical Specimen Handover from Operation Theater to Laboratory: A Survey', *Annals of maxillofacial surgery*, 8(2), pp. 234–238.
26. Kumar, S. and Rahman, R. (2017) 'Knowledge, awareness, and practices regarding biomedical waste management among undergraduate dental students', *Asian journal of pharmaceutical and clinical research*, 10(8), p. 341.
27. Kumar, V., Shivanna, V. and Kopuri, R. C. (2019) 'Knowledge and attitude of pediatricians toward digit sucking habit in children', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 37(1), pp. 18–24.
28. Lowe, A. A. and Johnston, W. D. (1979) 'Tongue and jaw muscle activity in response to mandibular rotations in a sample of normal and anterior open-bite subjects', *American journal of orthodontics*, 76(5), pp. 565–576.
29. Majorana, A. *et al.* (2008) '[Pedodontist and pediatrician in the management of the child affected by systemic pathologies]', *Minerva pediatrica*, 60(4), pp. 473–479.
30. Mathew, M. G. *et al.* (2020) 'Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars:

Randomized controlled trial', *Clinical oral investigations*, pp. 1–6.
31. Mistry, P. *et al.* (2010) 'The occlusal effects of digit sucking habits amongst school children in Northamptonshire (UK)', *Journal of orthodontics*, 37(2), pp. 87–92.
32. Motta, L. J. *et al.* (2011) 'Association between halitosis and mouth breathing in children', *Clinics* , 66(6), pp. 939–942.
33. Nair, M. *et al.* (2018) 'Comparative evaluation of post-operative pain after pulpectomy with k-files, kedo-s files and mtwo files in deciduous molars -a randomized clinical trial', *Brazilian Dental Science*, 21(4), p. 411.
34. Neilson, W. A. (1934) 'Webster's new international dictionary of the English language., 2d ed., unabridged. ed', *Springfield, Mass. „C. & G. Merriam*.
35. Pacheco, M. C. T. *et al.* (2015) 'Guidelines proposal for clinical recognition of mouth breathing children', *Dental Press Journal of Orthodontics*, pp. 39–44. doi: 10.1590/2176-9451.20.4.039-044.oar.
36. Palati, S. *et al.* (2020) 'Knowledge, Attitude and practice survey on the perspective of oral lesions and dental health in geriatric patients residing in old age homes', *Indian Journal of Dental Research*, p. 22. doi: 10.4103/ijdr.ijdr_195_18.
37. Panchal, V., Gurunathan, D. and Shanmugaavel, A. K. (2017) 'Smartphone application as an aid in determination of caries risk and prevention: A pilot study', *European journal of dentistry*, 11(4), pp. 469–474.
38. Panchal, V., Jeevanandan, G. and Subramanian, E. (2019) 'Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 37(1), pp. 75–79.
39. Panchal, V., Jeevanandan, G. and Subramanian, E. M. G. (2019) 'Comparison of post-operative pain after root canal instrumentation with hand K-files, H-files and rotary Kedo-S files in primary teeth: a randomised clinical trial', *European archives of paediatric dentistry: official journal of the European Academy of Paediatric Dentistry*, 20(5), pp. 467–472.
40. Paramasivam, A., Vijayashree Priyadharsini, J. and Raghunandhakumar, S. (2020) 'N6-adenosine methylation (m6A): a promising new molecular target in hypertension and cardiovascular diseases', *Hypertension research: official journal of the Japanese Society of Hypertension*, 43(2), pp. 153–154.
41. Pc, J., Marimuthu, T. and Devadoss, P. (2018) 'Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study', *Clinical implant dentistry and related research*. Available at: https://europepmc.org/article/med/29624863.
42. Quashie-Williams, R., Dacosta, O. O. and Isiekwe, M. C. (2007) 'The Prevalence of Oral Habits Among 4 to 15 year Old School Children in Lagos', *Nigerian Journal of Health and Biomedical Sciences*. doi: 10.4314/njhbs.v6i1.11628.
43. Ramadurai, N. *et al.* (2019) 'Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial', *Clinical oral investigations*, 23(9), pp. 3543–3550.
44. Ramakrishnan, M., Dhanalakshmi, R. and Subramanian, E. M. G. (2019) 'Survival rate of different fixed posterior space maintainers used in Paediatric Dentistry - A systematic review', *The Saudi dental journal*, 31(2), pp. 165–172.
45. Ramesh, A. *et al.* (2018) 'Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study', *Journal of periodontology*, 89(10), pp. 1241–1248.
46. Ramesh, N., Guruanthan, D. and Karthikeyan, S. A. (2016) 'Association of nonnutritive sucking habits and malocclusion: A cross-sectional study', *International Journal of Pedodontic Rehabilitation*, 1(1), p. 15.
47. Ravichandran, P. (2017) 'Parents knowledge and attitude of orthodontic treatment towards their school going children in Chennai-A Questionnaire Survey', *J Clin Dent Sci*, 2(1), pp. 5–11.
48. Ravikumar, D. *et al.* (2018) 'DNA profiling of Streptococcus mutans in children with and without black tooth stains: A polymerase chain reaction analysis', *Dental research journal*, 15(5), p. 334.
49. Ravikumar, D. *et al.* (2019) 'Evaluation of McNamara's analysis in South Indian (Tamil Nadu) children between 8-12 years of age using lateral cephalograms', *Journal of oral biology and craniofacial research*, 9(2), pp. 193–197.
50. Ravikumar, D., Jeevanandan, G. and Subramanian, E. M. G. (2017) 'Evaluation of knowledge among general dentists in treatment of traumatic injuries in primary teeth: A cross-sectional questionnaire study', *European journal of dentistry*, 11(2), pp. 232–237.
51. Ravindra, V. *et al.* (2018) 'A comparative evaluation between dermatoglyphic patterns and different terminal planes in primary dentition', *Journal of clinical and experimental dentistry*, 10(12), pp. e1149–e1154.
52. Ravindra, V. *et al.* (2019) 'A comparative evaluation between cheiloscopic patterns and the permanent molar relationships to predict the future malocclusions', *Journal of clinical and experimental dentistry*,

11(6), pp. e553–e557.
53. R, H. *et al.* (2020) 'CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene', *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*, pp. 306–312. doi: 10.1016/j.oooo.2020.06.021.
54. Rodríguez, Y., Casasa Araujo, R. and Natera, A. C. (2007) 'Tips en Ortodoncia y sus secretos'. Venezuela: Editorial Amolca.
55. Salah, A. (2007) 'Mothers' attitude toward digit sucking habits in children of United Arab Emirates', *The International journal of orofacial myology: official publication of the International Association of Orofacial Myology*, 33, pp. 37–46.
56. Samuel, S. R. (2021) 'Can 5-year-olds sensibly self-report the impact of developmental enamel defects on their quality of life?', *International journal of paediatric dentistry / the British Paedodontic Society [and] the International Association of Dentistry for Children*, 31(2), pp. 285–286.
57. Samuel, S. R., Acharya, S. and Rao, J. C. (2020) 'School Interventions-based Prevention of Early-Childhood Caries among 3-5-year-old children from very low socioeconomic status: Two-year randomized trial', *Journal of public health dentistry*, 80(1), pp. 51–60.
58. Saravanan, M. *et al.* (2018) 'Synthesis of silver nanoparticles from Phenerochaete chrysosporium (MTCC-787) and their antibacterial activity against human pathogenic bacteria', *Microbial pathogenesis*, 117, pp. 68–72.
59. Sneha, S. and Others (2016) 'Knowledge and awareness regarding antibiotic prophylaxis for infective endocarditis among undergraduate dental students', *Asian Journal of Pharmaceutical and Clinical Research*, pp. 154–159.
60. Somasundaram, S. *et al.* (2015) 'Fluoride content of bottled drinking water in Chennai, Tamilnadu', *Journal of clinical and diagnostic research: JCDR*, 9(10), p. ZC32.
61. Sridharan, G. *et al.* (2019) 'Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma', *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*, 48(4), pp. 299–306.
62. Stefănescu, I. M., Zetu, I. and Rusu, M. (2011) '[News on prevalence of vicious habits in children]', *Revista medico-chirurgicala a Societatii de Medici si Naturalisti din Iasi*, 115(4), pp. 1258–1261.
63. Subramanyam, D. *et al.* (2018) 'Comparative evaluation of salivary malondialdehyde levels as a marker of lipid peroxidation in early childhood caries', *European journal of dentistry*, 12(1), pp. 67–70.
64. Tausche, E., Luck, O. and Harzer, W. (2004) 'Prevalence of malocclusions in the early mixed dentition and orthodontic treatment need', *European journal of orthodontics*, 26(3), pp. 237–244.
65. Turgeon-O'Brien, H. *et al.* (1996) 'Nutritive and nonnutritive sucking habits: a review', *ASDC journal of dentistry for children*, 63(5), pp. 321–327.
66. Vignesh, R. *et al.* (2019) 'Management of Complicated Crown-Root Fracture by Extra-Oral Fragment Reattachment and Intentional Reimplantation with 2 Years Review', *Contemporary clinical dentistry*, 10(2), pp. 397–401.
67. Vijayakumar Jain, S. *et al.* (2019) 'Evaluation of Three-Dimensional Changes in Pharyngeal Airway Following Isolated Lefort One Osteotomy for the Correction of Vertical Maxillary Excess: A Prospective Study', *Journal of maxillofacial and oral surgery*, 18(1), pp. 139–146.
68. Vijayashree Priyadharsini, J. (2019) 'In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens', *Journal of periodontology*, 90(12), pp. 1441–1448.
69. Vijayashree Priyadharsini, J., Smiline Girija, A. S. and Paramasivam, A. (2018) 'In silico analysis of virulence genes in an emerging dental pathogen A. baumannii and related species', *Archives of oral biology*, 94, pp. 93–98.
70. Vishnu Prasad, S. *et al.* (2018) 'Report on oral health status and treatment needs of 5-15 years old children with sensory deficits in Chennai, India', *Special care in dentistry: official publication of the American Association of Hospital Dentists, the Academy of Dentistry for the Handicapped, and the American Society for Geriatric Dentistry*, 38(1), pp. 58–59.
71. Warren, J. J. *et al.* (2005) 'Effects of nonnutritive sucking habits on occlusal characteristics in the mixed dentition', *Pediatric dentistry*, 27(6), pp. 445–450.
72. Woodside, D. G. (2000) 'The significance of late developmental crowding to early treatment planning for incisor crowding', *American journal of orthodontics and dentofacial orthopedics: official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*, 117(5), pp. 559–561.
73. Wu, F. *et al.* (2019) 'Biologically synthesized green gold nanoparticles from Siberian ginseng induce growth-inhibitory effect on melanoma cells (B16)', *Artificial cells, nanomedicine, and biotechnology* , 47(1), pp. 3297–3305.

74. Yamaguchi, H. and Sueishi, K. (2003) 'Malocclusion associated with abnormal posture', *The Bulletin of Tokyo Dental College*, 44(2), pp. 43–54.