

**ASSESSMENT OF UNDERGRADUATE DENTAL STUDENTS' KNOWLEDGE ON ESTHETIC SMILE AND THE PERIODONTAL TREATMENT OPTIONS TO ACHIEVE ESTHETIC SMILE- A SURVEY****Apoorva Sokke Mallikarjunappa<sup>1</sup>, Kommana Poojitha<sup>2\*</sup>, Suchetha Aghanashini<sup>3</sup>, Sapna Nadiger<sup>4</sup>, Darshan Basavaraj Mundinamane<sup>5</sup> and Reshmi V. Nair<sup>6</sup>**<sup>1,4,5</sup>MDS, Reader Department of Periodontics, D A P M R V Dental College, Bangalore.<sup>2</sup>Post-Graduate Department of Periodontics, D A P M R V Dental College, Bangalore.<sup>3</sup>MDS, Professor and Head Department of Periodontics, D A P M R V Dental College, Bangalore.<sup>6</sup>MDS, Senior Lecturer, Department of Periodontics, Oxford Dental College, Bangalore.**\*Corresponding Author: Dr. Kommana Poojitha**

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**ABSTRACT**

**Introduction:** Periodontics, which is among the most rapidly developing dental specialties focuses on the soft and hard tissues which maintains the tooth structure. The contour, colour, and general aesthetics of the gingiva and related soft tissues have received less focus in the curriculum for the undergraduate dental students. **Aim:** To assess the knowledge of final year undergraduate dental students on soft tissue factors effecting esthetic smile and its periodontal treatment options. **Materials and Methods:** This was a questionnaire-based survey, conducted from May 2022 to October 2022 in Bangalore city. Questionnaire consisting of 10 questions related to soft tissue factors affecting esthetic smile and their various periodontal treatment options were assessed. **Results:** Total responses obtained were 505. More than 50% of the students were aware about the factors affecting an esthetic smile like gummy smile, black triangles, aberrant frenum, pigmented gums and the results are statistically significant ( $p < 0.005$ ). More than 50% of them were aware about the periodontal treatment options, except for black triangles (only 23% were aware). **Conclusion:** Dental curriculum should stress up on the various factors and treatment options available to create an esthetic smile, for better patient education and management by the under graduate dental students.

**KEYWORDS:** Aesthetics; Black triangle; Depigmentation; Gummy smile; Aberrant frenum.**INTRODUCTION**

An esthetic smile plays a crucial function in an individual's interactions in the society and have a significant impact on patient's self-confidence.<sup>[1]</sup> A pleasant smile results from the harmonic interrelation among the parts of the oral cavity, which includes the lips, teeth, and gingiva.<sup>[2]</sup> The goal of esthetic dentistry is to alter teeth such that they have aesthetically acceptable dimensions and are arranged in a way that complements the soft tissues around them.<sup>[3]</sup>

Dental features that confer to the smile comprises of size, shape, and color of the teeth, their alignment in the arch, angulation of the crown structure, position of the midline and dental arch uniformity. Midline diastema and interdental spacing can disrupt the integrity of the dental composition. Gingival elements that add to an esthetic smile, includes gingival colour, contour, texture, and height. Esthetic value of a pleasing smile can be diminished by inflammation, blunted interdental papillae,

open gingival embrasures (black triangle), and the irregular marginal gingiva.<sup>[4]</sup>

The key elements of an esthetically pleasing smile are the health and manifestation of the gingiva. Aim of all the perio-esthetic methods is to render balance between the pink and white components.<sup>[5]</sup> Knowledge regarding the basic dental aesthetic considerations facilitate dental students in understanding aesthetic appeal and to interact with patients during the planning and execution of treatment.<sup>[6]</sup> It is important to have a thorough understanding of what an ideal smile looks like and what elements can affect while creating an attractive, and aesthetic smile. This will undoubtedly have an impact on the necessary successful treatment plan.<sup>[3]</sup> It is highly essential for the undergraduate dental students to have proper knowledge on aesthetic criteria and standards. Scarcity of clinical knowledge, and training that easily spots asymmetries has effect on the treatment modalities that are rendered by the undergraduates in their training period.<sup>[7]</sup>

Didem Nalbantgil et al. through his study concluded that 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> year dental students were critical in the evaluation of smiles (mean scores <60). However, the 5<sup>th</sup>-year students were more critical than the 3<sup>rd</sup>- and 4<sup>th</sup>-year students in smile evaluation.<sup>[8]</sup> According to American Dental Association's Survey Center, study conducted on dental school curricula revealed that an average dental student barely allocates 4.8 percent of their whole training in their dental school to learn about esthetic dentistry.<sup>[9]</sup> Prior to treatment planning, it is imperative to rank patients' preferences and let them know about all of their possibilities (Levin, 2003). The treatment plan for esthetic cases relies on several factors and has to be well judged during clinical examination to obtain satisfactory results.<sup>[10]</sup> In order to understand the way an undergraduate student handles a patient we need to identify the level of knowledge among students depending on which we can guide them in their area of lacunae.<sup>[11]</sup>

There are very few studies wherein questionnaire is used to assess the knowledge of undergraduate dental students on soft tissue factors effecting esthetic smile and its periodontal treatment options. Thus, this study aims to assess the current state of undergraduate dental student's knowledge about the soft tissue factors affecting esthetic smile and the periodontal treatment options to achieve esthetic smile.

## MATERIALS AND METHODS

This questionnaire-based survey was conducted in May 2022. It was an online questionnaire which used Google Forms to accumulate data from 505 final year undergraduate dental students only. The survey was a multiple-choice questionnaire consisting of 10 questions and divided into following sections:

1. Knowledge on soft tissue factors affecting esthetic smile
2. Knowledge on periodontal treatment options to achieve an esthetic smile

An ethical clearance was obtained for this study and an informed consent was taken from the participants via e-mails and social media platforms. An epidemiologist was consulted for validating the content in the questionnaire.

### Statistical analysis

Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp., was used to perform the statistical analysis. Descriptive analysis of all the explanatory and outcome parameters was done using frequency and proportions for categorical variables, whereas in Mean & SD for continuous variables. Chi Square Goodness of Fit Test was used to compare the distribution of subjects' responses to the study questionnaire. Chi Square Test was used to compare the distribution of subjects' responses to the study questionnaire based on gender.

## RESULTS

**Gender distribution- (Table-1, Graph 1)** A total of 505 undergraduate dental students, were included. Among them 28.7% were males and 71.3% were females.

### Self-reported knowledge on soft tissue factors affecting esthetic smile questionnaire

When a question "What are the factors that can affect an esthetic smile?" was asked, 28.1% of respondents (38.6% of males, 23.9% of females) choose gummy smile, pigmented gums and black triangles. (Table 2 and Table 4; Graph 2 and Graph 6). Responses when compared with each other, and between genders the differences were statistically significant at  $p < 0.001$ .

When a question "Which one of these could be a gummy smile?" was asked, 81.0% choose all correct options in the form of pictures (75.9% of males, 83.1% of females). (Table 2 and Table 4; Graph 2). Responses when compared with each other, the differences were statistically significant at  $p < 0.001$  and between genders the differences were statistically insignificant.

When a question "What are pigmented gums" was asked, 53.7% answered "Brown or black patches on the gingiva" (37.2% of males responded and 60.3% of females responded) (Table 2 and Table 4; Graph 2, Graph 6). When the responses were compared with each other, and between genders the differences were statistically significant at  $p$ -value  $< 0.001$ .

When a question "What do you think an aberrant frenum can be?" was asked 61.0% answered "Frenal attachment that can cause midline diastema, gingival recession, malalignment of teeth" (61.4% of males, 60.8% of females responded) (Table 2 and Table 4; Graph 3). When the responses were compared with each other, the differences were statistically significant at  $p$ -value  $< 0.001$  and between genders the differences were found to be statistically insignificant.

When a question "What do you think is a black triangle?" was asked, 62.4% answered "Triangle-shaped gaps between your teeth" (47.6% of males responded and 68.3% of females responded). (Table 2 and Table 4; Graph 3, Graph 6). When the responses were compared with each other, and between genders the differences were statistically significant at  $p$ -value  $< 0.001$ .

### Self-reported knowledge on periodontal treatment options to achieve an esthetic smile questionnaire

When a question "What do you think could be the treatment for gummy smile?" was asked, 56.0% answered "Gingivectomy (scalpel/ Laser)" (39.3% of males responded and 62.8% of females responded). (Table 3 and Table 5; Graph 4, Graph 7). When the responses were compared with each other, and between genders the differences were statistically significant at  $p$ -value  $< 0.001$ .

When a question “What do you think could be the treatment for pigmented gums among the options below?” was asked, 42.2% of respondents (30.3% of males responded and 46.9% of females responded) choose “Depigmentation using scalpels or lasers, Electrosurgery, Gingival grafting”. (Table 3 and Table 5; Graph 4, Graph 7). When the responses were compared with each other, the differences were statistically significant at  $p$ -value  $< 0.001$  and between genders the differences were statistically significant at  $p$ -value  $< 0.01$ .

When a question “What do you think could be the treatment for high or aberrant frenum?” was asked, 55.8% answered “Frenectomy” (49.7% of males, 58.3% of females responded). (Table 3 and Table 5; Graph 5, Graph 7). Responses when compared with each other, the differences were statistically significant at  $p$ -value  $< 0.001$  and when between genders the differences were statistically significant at  $p$ -value  $< 0.05$ .

68.1% positive responses (64.8% of males responded and 69.4% of females responded), and 31.9% negative responses (35.2% of males responded and 30.6% of females responded) were obtained for the question “Do you think black triangle can be treated?” (Table 3 and Table 5; Graph 5). Responses when compared with each other, the differences were statistically significant at  $p$ -value  $< 0.001$  and between genders the differences were found to be statistically insignificant.

When a question “If YES, what do you think is the treatment for black triangle?” was asked to those who gave a positive response to question 9, 23.0% answered “Injecting hyaluronic acid” (26.6% of males responded and 21.6% of females responded). (Table 3 and Table 5; Graph 5). Responses when compared with each other, the differences were statistically significant at  $p$ -value  $< 0.001$  and when each response was compared between genders the differences was found to be statistically insignificant.

## DISCUSSION

Patients who aspire to have an esthetic smile are mostly seen visiting a periodontist regularly.<sup>[12]</sup> Dentists must balance patients' dental demands with highly aesthetic treatment solutions that are also as little invasive as possible to healthy tooth structures and periodontal tissues.<sup>[13]</sup>

One of the major and essential dental expertise that under graduate dental students should possess is the capacity to recognise a patient's aesthetic needs and to assess the extent to which those needs or desires can be fulfilled, according to the General Assembly of the Association for Dental Education in Europe and the Dental Education Association in North America. Dental students must be capable enough, to make clinical choices on dental aesthetics, and know when to step in or

refer patients as they are the vital elements of the dental workplace.<sup>[14]</sup>

In a study conducted by Goldstein et al., of the 73% of the patients who requested information concerning esthetics, most of the dentists stated that no treatment is indicated. Although all dentists receive sufficient training to correct cosmetic deficiencies, it might be said that the sensitivity and awareness of the need for esthetics on the part of these dentists were minimized and apparently too few have been made aware of the varying esthetic motivations existing among their patients.<sup>[15]</sup> As for suggestions, looking into how particular dental course content influences students' experiences with dentofacial aesthetics would seem to be a potential direction for future research.<sup>[16]</sup> Hence the current study was carried out to assess the knowledge of undergraduate dental students on soft tissue factors effecting esthetic smile and its periodontal treatment options. On evaluating the data obtained for the following questionnaire, a total of 505 responses were received for the following set of questions as follows:

Maxillary anterior region possesses a greater concern in terms of esthetics in all patients. Pigmentation, high lip line, gummy smile, black triangle, etc. are the common complaints with regard to the esthetic zone.<sup>[17]</sup> According to the present survey results, 28.1% of the dental students were able to identify the factors that can affect an esthetic smile. Along with the correct options, rest of the participants considered gingival consistency also as a factor that effects esthetic smile. Accurate identification of the factors affecting esthetic smile helps the undergraduate students firstly in diagnosing and to make clinical decisions pertaining to dental aesthetics, to understand when to intervene or refer and secondly for educating the patients about the consequences of lack of treatment. Dental curriculum should include the factors affecting smile esthetics so that the dental students get proper exposure.

In our survey 81.0% of dental students were aware of gummy smile and were able to identify correctly, where as in a study conducted by Ioi et al., author concluded that students were found to be less tolerant against gummy smile, while orthodontists found 0 mm gingival display the most attractive.<sup>[18]</sup> Other studies were conducted where they assessed how much amount of gingival display is aesthetic, greater than two thirds of the dental students perceived normal or 1 mm increase in gingival display. According to Ker and colleagues, the optimal gingival display is 2.1 mm, with a 4 mm acceptable range.<sup>[19]</sup>

53.7% of the undergraduates responded pigmented gums as brown or black patches on the gingiva and correctly identified from the images provided. It is important for dental students to have knowledge on pigmented gums since melanin pigmentation of the gingiva causes embarrassment in smile-conscious individuals.<sup>[20]</sup>

Frenum serves to maintain stabilization among the developing bones and the lip muscles. Mobility of these structures can be altered by the presence of an abnormal frenal attachment, which may also affect the positioning of the jaw and the teeth.<sup>[21]</sup> In our study 61% of the dental students answered aberrant frenum as frenal attachment that results in gingival recession, midline diastema, and malalignment of teeth. Knowledge regarding the aberrant frenal attachment and its sequelae helps in identifying the root cause of the esthetic problem present, which will further help in proper treatment plan.

The term "black triangles" refers to embrasures that extend from the cervical region of the teeth to the interproximal contact and have not been filled with the tissues of the gingiva.<sup>[22]</sup> 62.4% of respondents opted black triangles as "Triangle-shaped gaps between your teeth". It is important to have knowledge on black triangles as they are noticeably unaesthetic which negatively affects the smile, and also facilitates retention of food debris which can negatively affect the health of the periodontium.<sup>[22]</sup>

By correcting gummy smile, gingival display will be minimized thus enhancing the esthetic quality of smile.<sup>[23]</sup> 56% of the under graduates responded gingivectomy (Scalpel / laser) as the line of treatment for gummy smile. Knowing all the treatment options helps in wisely advising the patient appropriate treatment, based on the factors that caused the gummy smile and also the needs and demands of the patient.

The removal or reduction of gingival hyperpigmentation is accomplished by a periodontal plastic surgery treatment known as gingival depigmentation.<sup>[20]</sup> 42.2% correctly answered that depigmentation can be done using scalpels or lasers, gingival grafting and electrosurgery. In a similar study conducted by Anubhav Das et al., among undergraduate dental students 36% opted cryosurgery and 50% opted for electrosurgery for the management of pigmented gums.<sup>[17]</sup>

Typically, frenectomy and frenotomy approaches are used to treat an abnormal frenum. In contrast to frenectomy, which involves completely removing the frenulum, including its connection to the underlying alveolar process, frenotomy involves the simple excisional release of the frenulum from its insertion point to its base and down to the alveolar process.<sup>[24]</sup> 55.8% of

the undergraduates responded frenectomy as the treatment option for aberrant frenum. In a similar study conducted by Anubhav Das et al., 49% of undergraduate dental students opted frenectomy and 35% opted for frenotomy for the management of papillary frenal attachment.<sup>[17]</sup>

Mansouri et al., 2013 found positive effect of Hyaluronic acid on papilla reconstruction in 11 patients with a total of 21 interdental papillae. The result of this study was an average change of 5.04 +/- 1.5 mm in the papilla defect.<sup>[25]</sup> Abdelkader EM, Ebrahim MA, found that, following hyaluronic acid gel injection, the size of black triangle decreased by 2.66mm.<sup>[25]</sup> From these studies it was concluded that black triangles can be treated. 68.1% of under graduates responded that black triangles can be treated. Results of our study are in comparison with the study conducted by Anubhav Das et al., where 43% of undergraduate dental students responded that black triangles can be treated.<sup>[17]</sup> By knowing the possibility of treating black triangles, along with patient education, various treatment options and the extent and probability of treating the black triangles can be foreseen.

Gingival black triangles can be managed by periodontal plastic surgical procedures.<sup>[26]</sup> Only about 23.0% answered correctly that black triangles can be treated by "Injecting hyaluronic acid". This shows that undergraduates are lacking knowledge on the various treatment options pertaining to the management of black triangles and dental curriculum has not extensively included various treatment options in the management of black triangles.

Paken G, Ünal M conducted a study to investigate the esthetic perceptions of 2nd grade dental students before and after training. According to the results of the analysis, it was found that the answers before and after the education were statistically significant. It was concluded that professional dental education may affect the esthetic evaluation of smile.<sup>[27]</sup>

The findings of studies of the perception of smile aesthetics reported to date have varied widely in terms of analytical methods and data collection instruments (web-based surveys, self-reported perception, photographs, software-altered images) and included a wide range of smile features and sociocultural parameters. So, it is difficult to compare their findings.<sup>[14]</sup>

**Table 1: Gender distribution among study subjects.**

Variable	Category	n	%
Gender	Males	145	28.7%
	Females	360	71.3%

**Table 2: Comparison of subjects' responses to the questions related to soft tissue factors affecting the esthetic smile using Chi Square Goodness of Fit Test.**

Questions	Responses	n	%	$\chi^2$ value	p-value
1. What are the factors that can affect an esthetic smile?	1, 3, 4	68	13.5%	222.485	<0.001*
	1, 2, 3	142	28.1%		
	2, 3, 4	39	7.7%		
	1,2,3,4	256	50.7%		
2. Which one of these could be a gummy smile?	2, 4, 3	11	2.2%	850.050	<0.001*
	1, 4, 3	48	9.5%		
	1, 2, 4	409	81.0%		
	1, 2, 3	37	7.3%		
3. What are pigmented gums?	Brown or black patches on the gingiva	271	53.7%	321.859	<0.001*
	Whitish patches on the gingiva	31	6.1%		
	Reddish patches on the gingiva	33	6.5%		
	All of the above	170	33.7%		
4. What do you think an aberrant frenum can be?	Frenal attachment that can cause gingival recession	56	11.1%	368.830	<0.001*
	Frenal attachment that can cause midline diastema	105	20.8%		
	Frenal attachment that can cause malalignment of teeth	36	7.1%		
	All of the above	308	61.0%		
5. What do you think is a black triangle?	Blackish discoloration of the gingiva	57	11.3%	402.715	<0.001*
	Triangle-shaped gaps between your teeth	315	62.4%		
	All of the above	107	21.2%		
	None of the above	26	5.1%		

\* - Statistically Significant

**Note:** Options for Question no.1: 1 - Gummy smile 2. Black triangle 3. Pigmented gums 4. Gingival consistency.**Table 3: Comparison of subjects' responses to the questions related to periodontal treatment options to achieve an esthetic smile using Chi Square Goodness of Fit Test.**

Questions	Responses	n	%	$\chi^2$ value	p-value
6. What do you think could be the treatment for gummy smile?	Gingivectomy (scalpel/ Laser)	283	56.0%	355.032	<0.001*
	Hyaluronic acid injection	39	7.7%		
	Endodontic burs	20	4.0%		
	All of the above	163	32.3%		
7. What do you think could be the treatment for pigmented gums among the options below?	1, 4	66	13.1%	127.642	<0.001*
	2, 3	65	12.9%		
	1, 2, 3	213	42.2%		
	1, 2, 3, 4	161	31.9%		
8. What do you think could be the treatment for high or aberrant frenum?	Orthodontic treatment	16	3.2%	343.673	<0.001*
	Frenectomy	282	55.8%		
	Gingivoplasty	49	9.7%		
	All of the Above	158	31.3%		
9. Do you think black triangle can be treated?	Yes	344	68.1%	66.315	<0.001*
	No	161	31.9%		
10. If YES, what do you think is the treatment for black triangle?	Injecting hyaluronic acid	79	23.0%	114.581	<0.001*
	Scaling and root planing	75	21.8%		
	Botox injection	26	7.6%		
	All of the Above	164	47.7%		

\* - Statistically Significant

**Note:** Options for Question no.7: 1. Depigmentation using scalpels or lasers, 2. Electro surgery, 3. Gingival grafting, 4. Gingival massage

**Table 4: Gender based comparison of the responses to the questions related to soft tissue factors affecting the esthetic smile using Chi Square Test.**

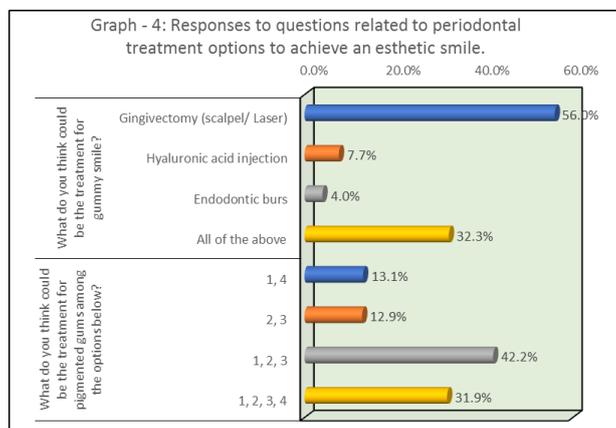
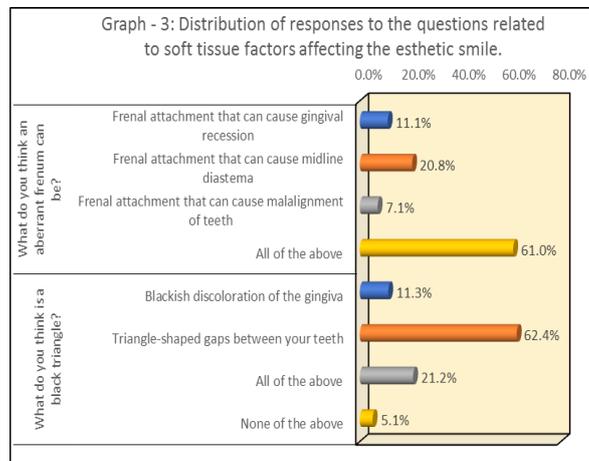
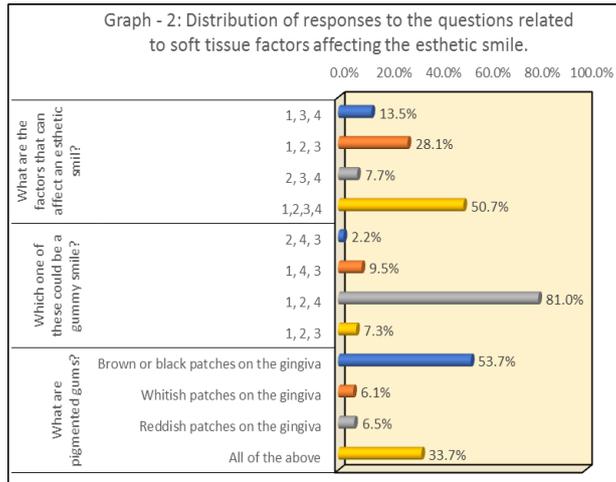
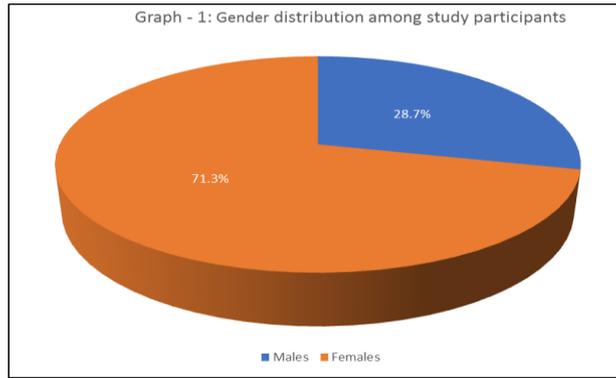
Questions	Responses	Males		Females		p-value
		n	%	n	%	
1. What are the factors that can affect an esthetic smile?	1, 3, 4	24	16.6%	44	12.2%	<0.001*
	1, 2, 3	56	38.6%	86	23.9%	
	2, 3, 4	13	9.0%	26	7.2%	
	1,2,3,4	52	35.9%	204	56.7%	
2. Which one of these could be a gummy smile?	2, 4, 3	4	2.8%	7	1.9%	0.18
	1, 4, 3	20	13.8%	28	7.8%	
	1, 2, 4	110	75.9%	299	83.1%	
	1, 2, 3	11	7.6%	26	7.2%	
3. What are pigmented gums?	Brown or black patches on the gingiva	54	37.2%	217	60.3%	<0.001*
	Whitish patches on the gingiva	12	8.3%	19	5.3%	
	Reddish patches on the gingiva	19	13.1%	14	3.9%	
	All of the above	60	41.4%	110	30.6%	
4. What do you think an aberrant frenum can be?	Frenal attachment that can cause gingival recession	16	11.0%	40	11.1%	0.90
	Frenal attachment that can cause midline diastema	28	19.3%	77	21.4%	
	Frenal attachment that can cause malalignment of teeth	12	8.3%	24	6.7%	
	All of the above	89	61.4%	219	60.8%	
5. What do you think is a black triangle?	Blackish discoloration of the gingiva	20	13.8%	37	10.3%	<0.001*
	Triangle-shaped gaps between your teeth	69	47.6%	246	68.3%	
	All of the above	48	33.1%	59	16.4%	
	None of the above	8	5.5%	18	5.0%	

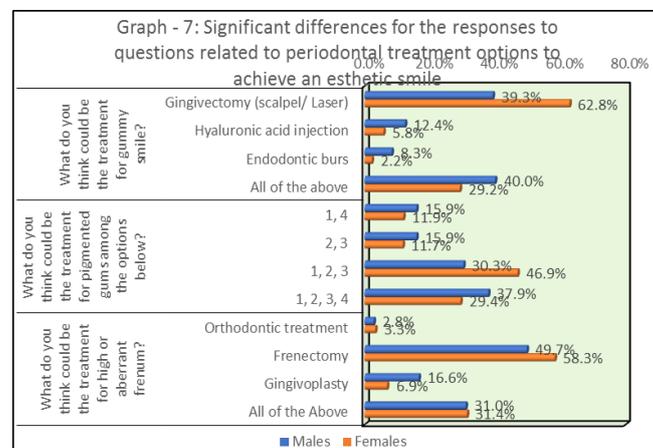
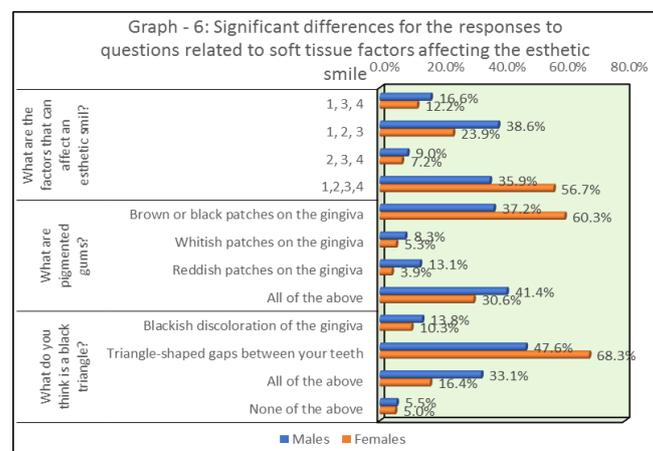
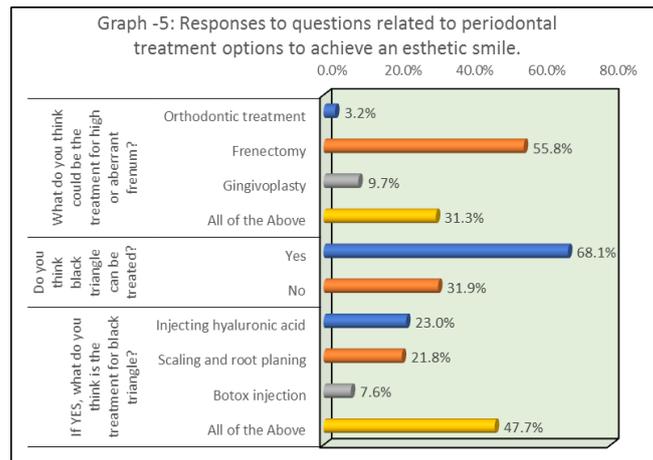
\* - Statistically Significant

**Table 5: Gender based comparison of the responses to the questions related to periodontal treatment options to achieve an esthetic smile using Chi Square Test.**

Questions	Responses	Males		Females		p-value
		n	%	n	%	
6. What do you think could be the treatment for gummy smile?	Gingivectomy (scalpel/ Laser)	57	39.3%	226	62.8%	<0.001*
	Hyaluronic acid injection	18	12.4%	21	5.8%	
	Endodontic burs	12	8.3%	8	2.2%	
	All of the above	58	40.0%	105	29.2%	
7. What do you think could be the treatment for pigmented gums among the options below?	1, 4	23	15.9%	43	11.9%	0.008*
	2, 3	23	15.9%	42	11.7%	
	1, 2, 3	44	30.3%	169	46.9%	
	1, 2, 3, 4	55	37.9%	106	29.4%	
8. What do you think could be the treatment for high or aberrant frenum?	Orthodontic treatment	4	2.8%	12	3.3%	0.01*
	Frenectomy	72	49.7%	210	58.3%	
	Gingivoplasty	24	16.6%	25	6.9%	
	All of the Above	45	31.0%	113	31.4%	
9. Do you think black triangle can be treated?	Yes	94	64.8%	250	69.4%	0.31
	No	51	35.2%	110	30.6%	
10. If YES, what do you think is the treatment for black triangle?	Injecting hyaluronic acid	25	26.6%	54	21.6%	0.48
	Scaling and root planing	21	22.3%	54	21.6%	
	Botox injection	9	9.6%	17	6.8%	
	All of the Above	39	41.5%	125	50.0%	

\* - Statistically Significant





**Limitations of the study**

Out of the various existing approaches, such as web-based surveys, self-reported perception, photographs, software-altered images we used only one of the approaches i.e., through E-mail and whatsapp to evaluate smile aesthetics. Another limitation was that the subjects had different teachers, who may have influenced their perception of smile aesthetics. However, the students were undertaking the same programme of study.

**CONCLUSION**

With in the limitations of the study conducted, it was concluded that, more than 50% of the under graduate

dental students were about the soft tissue factors affecting an esthetic smile. Most of them were aware of the periodontal aesthetic treatment procedures to create an esthetic smile. However, many were not aware regarding the various treatment options available for the management of black triangles. Dental curriculum should stress up on the various soft tissue factors and treatment options available to create an esthetic smile, for better patient education and management by the final year under graduate dental students.

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**Annexure****Self-reported questionnaire****Knowledge on soft tissue factors affecting esthetic smile.****1. What are the factors that can affect an esthetic smile?**

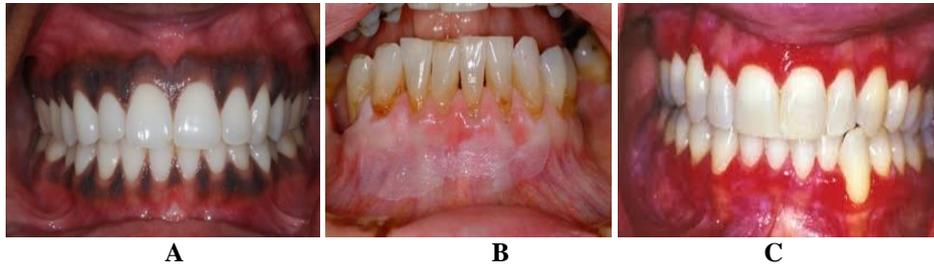
1. Gummy smile 2. Black triangle 3. Pigmented gums 4. Gingival consistency.
- a) 1, 3, 4  
b) 1, 2, 3  
c) 2, 3, 4  
d) 1,2,3,4

**2. Which one of these could be a gummy smile?**

- a) 2, 4, 3  
b) 1, 4, 3  
c) 1, 2, 4  
d) 1, 2, 3

**3. What are pigmented gums?**

- a) Brown or black patches on the gingiva.  
b) Whitish patches on the gingiva  
c) Reddish patches on the gingiva.  
d) All of the above.

**4. What do you think an aberrant frenum can be?**

- a) Frenal attachment that can cause gingival recession.  
b) Frenal attachment that can cause midline diastema  
c) Frenal attachment that can cause malalignment of teeth.  
d) All of the above

**5. What do you think is a black triangle?**

- a) Blackish discoloration of the gingiva  
b) Triangle-shaped gaps between your teeth  
c) All of the above  
d) None of the above



**Knowledge on periodontal treatment options to achieve an esthetic smile****6. What do you think could be the treatment for gummy smile?**

- a) Gingivectomy (scalpel/ Laser)
- b) Hyaluronic acid injection
- c) Endodontic burs
- d) All of the above

**7. What do you think could be the treatment for pigmented gums among the options below?**

- 1. Depigmentation using scalpels or lasers
  - 2. Electrosurgery
  - 3. Gingival grafting
  - 4. Gingival massage
- a) 1, 4
  - b) 2, 3
  - c) 1, 2, 3
  - d) 1, 2, 3, 4

**8. What do you think could be the treatment for high or aberrant frenum?**

- a) Orthodontic treatment
- b) Frenectomy
- c) Gingivoplasty
- d) All of the above

**9. Do you think black triangle can be treated?**

- a) Yes
- b) No

**10. If YES, what do you think is the treatment?**

- a) Injecting hyaluronic acid
- b) Scaling and root planing
- c) Botox injection
- d) All of the above