

## ORIGINAL RESEARCH



DOI: 10.2478/asmj-2023-0012

## Clinical and practical aspects of the gingival smile. A questionnaire-based survey.

Andreea Vlasiu<sup>1</sup>, Cristina-Larisa Friciu<sup>2</sup>, Ana-Petra Lazăr<sup>2</sup>, Timea Dako<sup>2</sup>, Luminița Lazăr<sup>2</sup><sup>1</sup> County Emergency Clinical Hospital of Târgu Mureș, Romania<sup>2</sup> George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu-Mureș, Romania

### Abstract

Introduction: One of the main elements of facial esthetics is represented by the smile. A harmonious proportion between the elements of facial esthetics is an important subject of interest in dentistry. Aim of the study: This research aims to evaluate the impact of the gummy smile on future dental practitioners. Materials and Methods: A survey containing 16 questions was designed to find out the students' perceptions about the ideal smile and if the gingival smile is considered youthful or unpleasing. The impact on their self-esteem, their willingness to change the gummy smile or not, the nonsurgical and surgical methods of treatment were also evaluated. Results: 212 answers were recorded and analyzed. Nearly three quarters (70.3%) of the respondents believe that having a gummy smile is unesthetic, while only 29.3% considered it to be a sign of youth. Self-esteem can be affected by having a gingival smile, but, according to the results, most of the students (45.8%) said that their daily lives have not been affected by it, 40.6% said that in a small amount, 10.4% said that their self-assurance has been very affected and only 3.3% admitted that the gummy smile distressed their confidence. When asked if they were willing to correct their gingival smile, 51.4% were open to improving it while 48.6% would not change it. Conclusions: Among dentistry students, excessive showing of the gums is believed to be unesthetic rather than a sign of youthfulness. The respondents are generally not affected in their daily life by having a gummy smile. Education regarding the methods of correcting it still needs to be addressed amongst future dental practitioners.

**Keywords:** gummy smile, dentistry students, esthetic, self-esteem.

### Introduction

The interest in self-appearance is no longer considered vanity but a necessity as far as interhuman relationships are concerned. It can also have a big psychological impact, especially on people's self-esteem. The smile symbolizes one of the most significant elements of face beauty [1].

Studies show that facial esthetic aspect, which is strongly influenced by a harmonious smile, has become a must-have in reaching social success [1,2].

The matter of what truly represents a balanced facial esthetic has been searched for since the time of the oldest civilizations. Phoenicians in 800 BCE and the Etruscan civilization in 900 BCE carved animal fangs to mimic the size and shape of the natural human teeth. It was only later in the 18th century that dentistry was recognized as a separate discipline and established its separate sections. Pierre Fauchard of France (1678-1761) and his colleagues have improved and promoted dentistry including esthetics. Nowadays

patients' personal experiences have a bigger impact on their preferences regarding their smile than a specialist's opinions [3].

Smile analysis has become a necessity when establishing the treatment plan. It is also used for providing a diagnosis and making a prognosis. It needs to be taken into consideration that esthetics is subjective and individualized because this, more than other areas of dentistry, is also based on the patient's personal background, such as culture and individual preference [4,5]. There are two types of smiles: a social smile which is reproducible and is the subject of interest to the orthodontists, and an emotional smile which varies depending on the patient's feelings [6].

Dental and periodontal factors such as the position, size, shape, and parallelism of the teeth, visibility of the gums together with the periodontal health status, symmetry, and proportion between these elements must be considered in establishing the treatment plan of an ideal smile. Another important factor is

represented by the lips, their shape, and fullness [6].

A complex facial and oral examination from an esthetic point of view includes five different parts: facial esthetics, gingival esthetics, macro-esthetics, mini-esthetics, and micro-esthetics. Macro-esthetics incorporates the median line, size, and shape of the teeth, mini-esthetics concerns the proportion between teeth and lips, and micro-esthetics contains the anatomy of the anterior teeth, incisal translucency, and the aspect of dental lobes.

Having a healthy, stable masticatory system in which periodontal tissues, muscles, joints, and occlusion are in harmony is also something to take into consideration [7,8,9].

The interpupillary line and the lips are two major characteristics that have an important part in a smile design. The first one must be perpendicular to the midline of the face and parallel to the occlusal plane. The aspects to consider regarding the lips are their width, symmetry, and fullness [10,11,12].

Healthy gingival tissue is an essential factor in obtaining a charming smile. The gingiva is situated 3 mm above the alveolar crest and needs to be firm and have a pale pink color with an orange peel texture. The interdental papillae have a slightly elongated and convex appearance, with a wavy, radiating arch course of the free gum that covers the cervical portion of the tooth [13,14].

An excessive buccal corridor is unesthetic and a narrow one is artificial, creating the vision of a mouth "full of teeth" [15]. The gingival margins are preferred to be symmetric and the cervical margins of the anterior teeth on a straight imaginary line from canine to canine. Upper central incisors and the cervical regions of the canines are situated approximately at the same level, but the neck of the upper lateral should be 2 mm under this level [16]. The color of the teeth is the first thing that can be seen while smiling. Shade, luminosity, and saturation are the three elements used to describe the color of the teeth [17,18].

When creating a brand-new smile, the personal visions of both the specialist and the patient are involved. For this reason, there are no objective criteria to define an optimal smile.

There are four types of smiles depending on the smile line:

- Low smile is determined by the exposure up to 75% of the height of clinical dental crowns of the canine-to-canine section. Because the interdental gingiva and the cervical parts of the teeth are not visible, this type of smile is unattractive.
- The average smile has a medium smile line when the tooth is fully visible (100%) or when there is more than 75% exposure of the clinical dental crowns and the interdental papillae. The standard esthetic exposure of the gums is between 0 mm and a maximum of 1 mm.
- High smile or a gummy smile when the exposed gums are visible up to 2 mm.
- A very high smile when the soft tissue is displayed more than 2-3 mm above the gingival zenith. The cervical and incisal parts of the teeth are visible which is unalluring [1].

A slight showing of the gums while smiling will offer a younger aspect and can be considered attractive for some people. Several authors state that a showing of 1 mm up to 2 mm of the gums is normal [19]. According to some studies, an ideal smile needs to expose the whole length of the maxillary teeth with up to 1 mm showing of the gingival tissue [20].

The muscles involved in creating a beautiful smile are the major zygomatic muscle together with the main muscle groups composed of the zygomatic, temporal, mandibular, cervical, and buccal ones [21].

There are different opinions when it comes to the relationship between the upper lip, maxillary incisors, and the gums while smiling which varies in the eyes of the orthodontists and the patients. Some studies suggest that the ideal position of the lips should be represented by a good alignment between the inferior margin of the upper lip and the gingival margins of the upper central incisors. However, other studies show that a certain degree of gum exposure accompanied by the whole visibility of the upper incisal group is more charming than zero visibility of the gums or the partial coverage of the teeth by the upper lip [5].

Approximately 10% of the population between the ages of 20 to 30 years have an excessive gum display which is more frequently found in women. The prevalence of the condition decreases with age, so the percentage of gummy smiles may be more common among younger age groups and much less common among seniors. Over time there is an increase in the volume and degree of coverage of the upper and lower lip, which in turn reduces the exposure of the gingival tissue and maxillary incisors [1].

This paper aims to evaluate the impact that the “gummy smile” has on dentistry students, the younger population which is up-to-date regarding this subject and very interested in obtaining a perfect smile.

### Material and methods

A survey containing 16 questions was designed to reach the objective of this paper. The questions were short, concise, straight to the point, and easy to understand, involving colloquial and not professional language. The questionnaires were distributed among dentistry students from different university centers from Romania (UMFST G.E. Palade Tg. Mureș.; UMF Gh.T.P opa Iași) between 1st of September 2022 and 30th of July 2023. All academic years were included, from 1st year to 6th year, with ages under and above 25, male and female responders. Confidentiality and anonymity were respected. All questions were compulsory.

The first three questions were designed to offer us demographic information about the participants regarding age, gender, and their current academic year. Their opinion about the importance of an ideal smile was noted by addressing the fourth question. The dentistry students' opinion about the perception of the gummy smile, whether it is considered youthful or displeasing, was obtained by addressing the following two questions. Data regarding the incidence of the gingival smile in general, the awareness of it, and the amount of gum exposure during smiling were also collected. The impact of the gummy smile on the future dentists' confidence and to what extent they were tempted to hide it was also identified throughout questions 10, 11, and 12. The next

three questions brought to light the therapeutic aspect of the gingival smile. The students had to answer if they were willing to improve it, how well informed they are about the actual methods of correcting it and if they would choose to correct it, would it be a surgical or a nonsurgical approach. The last question, which had a more personal tone, put the respondents in the position to choose or not to choose one or more methods of correcting the gummy smile. These included injecting botulinum toxin in the corner of the upper lip or bilaterally in the elevator muscles of the upper lip and the wing of the nose, hyaluronic acid infiltration in the paranasal region, upper lip augmentation with one of the listed substances, laser gingivectomy, classic gingivectomy and gingivoplasty, surgical intervention to reposition the upper lip and orthognathic surgery under the guidance of the orthodontist.

During this research, 212 answers were recorded and analyzed to fulfill the objective of this paper.

### Results

After collecting the results, according to the age analysis, 42% of the people questioned were younger than 25 and 58% were over 25 years. When talking about the gender distribution, 156 responses were from females, which represented 73.6% of the students, while 56 responses belonged to males which accounted for 26.4%.

Considering the academic year of the respondents, of the total number of 212 answers, 63.2% were in their final years while 36.8% were in their preclinical years.

When asked about the importance of an ideal smile, 54.2 % of the future dentists stated that having a perfect smile is very important, 25% answered that it is important while 20.8% said it is extremely important.

A percentage of 70.3% of those included in this research believe that having a gummy smile is unesthetic while only 29.3% considered it a sign of youth.

The excessive display of the gums is considered by 42.9% of the respondents a little unesthetic, 40.6% said that it is unesthetic and only 8% said it is extremely unesthetic.

When asked about whether they know someone with a gingival smile, 85.8% of the students said that they do and 14.2 % said they do not.

A percentage of 59.9% of the dentistry students asked about their awareness of the presence of the gummy smile since the start of

their studies said that they had noticed it, while 40.1% said they did not.

In cases with wide smile, less than 1 mm display of the gums was noticed in 49.1% of respondents; in 31.6% of the cases the tissue was shown less than 2 mm, and more than 3 mm in 19.3% of the cases (figure 1).

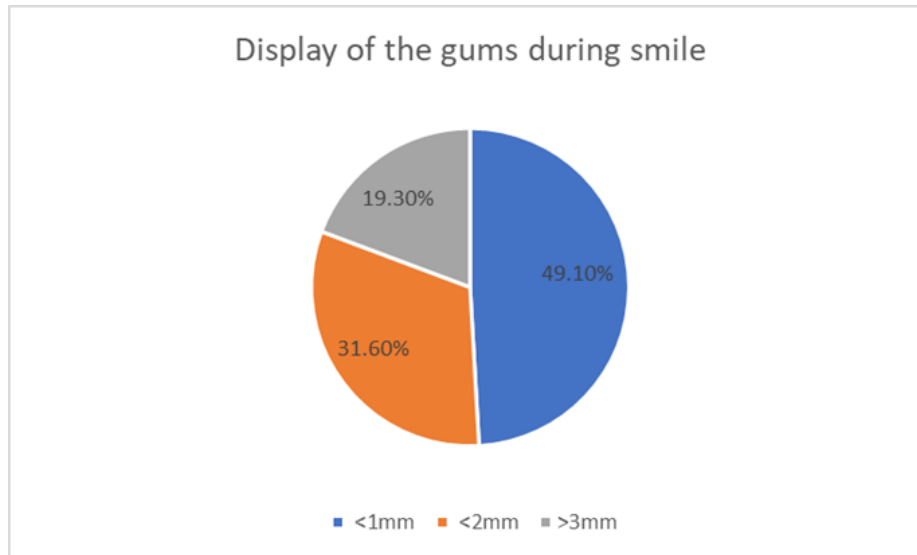


Figure 1. Display of the gums during smile

As an esthetic factor when analyzing a smile, 29.7 % of the students said that having a gummy smile would make them less compliant to smile while 70.3% said that they are not bothered by it.

Self-esteem can be affected by having a gingival smile, but, according to the results,

most of the students (45.8%) said that their daily lives have not been affected by it, 40.6% said that to a little extent, 10.4% said that their self-esteem has been very affected, and only 3.2% admitted that the gummy smile affects their confidence (figure 2).

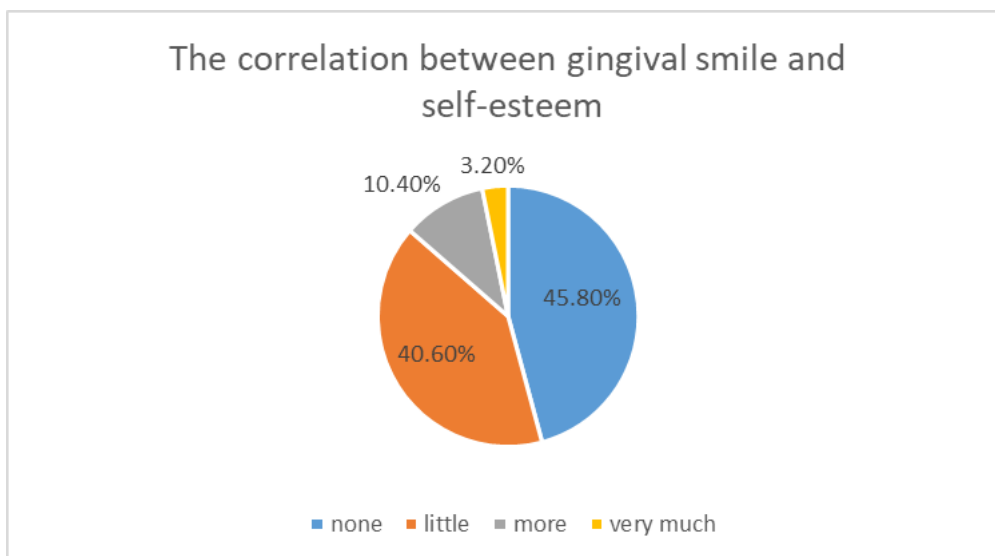


Figure 2. The correlation between gingival smile and self-esteem

Being aware of the excessive tissue showing, there might be a tendency to mask it, especially when in public, socializing, or when having pictures taken. Nearly half (49.1%) of those questioned are not tempted to hide their smile, 42.5% of students said they are sometimes tempted to do it, while only 8.4% said they are hiding it all the time. When asked if they were willing to correct their gummy smile, 51.4% were open to improving it, while 48.6% would not change it.

Even if the people questioned were dentistry students, 44.8% of them did not consider themselves well-informed about the methods of correcting a gingival smile. Over half of the respondents (55.2%) felt like they were very well-informed about this aspect.

If they were to choose a method of correcting the gummy smile, 44.3% would choose a nonsurgical procedure, 44.3% would not want to correct it, and 11.4% would opt for a surgical procedure (figure 3).

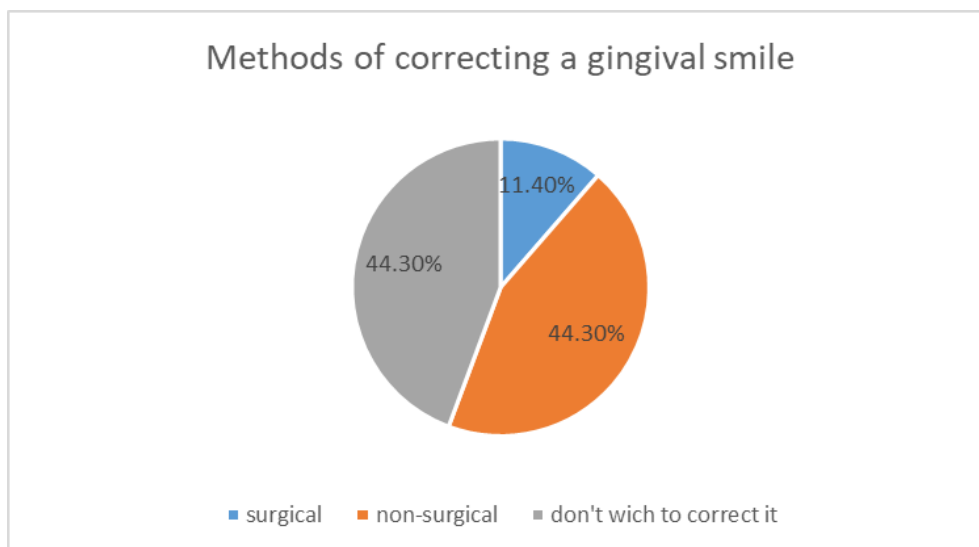


Figure 3. Methods of correcting a gingival smile

Regarding the preferences towards a method of treatment suggested by a doctor, 55.2% of the people questioned would not choose either of them because they like their smile. The treatment option consisting of injecting botulinum toxin in the upper lip or bilaterally in the elevator muscles of the upper lip and wing of the nose was chosen by 85 people (40.1%). Another option was the augmentation of the upper lip by injecting hyaluronic acid or botulinum toxin. This option was chosen by 72 people (34%), while 62 students (29.2%) would go for injecting hyaluronic acid in the paranasal region. 11 people (5.2%) opted for classic gingivectomy or laser gingivectomy. The least popular opinions among the students were the upper lip repositioning surgery and orthognathic surgery under the guidance of an orthodontist. These two were chosen by only 4 respondents, which accounted for 1.9%.

## Discussions

For this study, 212 dentistry students with a gingival smile were asked to express their opinions. Most of the responses came from people older than 25 years and the rest from under 25 years. What was notable was the fact that considerably more women than men participated in this research, resulting in a female predominance. They represented 73.6% of the respondents while men only 26.4%.

To highlight the difference in perception and assimilation of the gingival smile, the surveyed students were divided into two large categories: preclinical years 1st, 2nd, and 3rd, respectively clinical years 4th, 5th 6th. Through this division based on undergraduate enrollment years, attention was paid to the knowledge and clinical experience gained by the participants during their studies. Those in the final years seem to be the majority, in a percentage of 63.2%, compared to those in the first university years in a percentage of 36.8%.

Therefore, this scientific paper was predominantly based on the female vision of students mostly from the clinical years.

A study conducted in 2021 on the perception of an esthetic smile among students also had most of the questions answered by females in a percentage of 53.1% and reached the following conclusions: 5th year university students, especially females, presented higher esthetic expectations compared to 4th year clinical students and male students [22].

According to the research carried out to achieve the objective of this paper, more than half of those questioned (54.2%) stated that a perfect smile has an important significance for the participants, while 25% said that it is important, and only 20.8% considered it crucial.

As stated by literature, this study highlights the fact that the gingival smile is mostly considered to be unesthetic rather than youthful. A percentage of 70.3% of the participants in this research adds strength to the statement that a gummy smile is unattractive and only 29.2% sustain its youthful appearance.

Another study was carried out on the perception of the gingival smile. The results showed that the perceptual differences between the slightest and the most attractive smile with gingival display as noted by participants were not significant by gender or between dentists and the public [23].

Another fact stated by our study was that education in the dental field determined dentistry students to better perceive their gingival smile. According to the statistical results, more than half of the participants (59.9%) became aware of it after the beginning of the research. Hence, dental education has a major role in promoting self-discovery.

Some other key points acquired after this research were that the medium type of smile is the most frequently seen (49.1%) followed by the high smile (31.6%), and the very high smile (19.3%).

This research focused on improving the visual aspect of the gingival smile. The treatment methods of the gummy smile were not known by many of those questioned, but when they had to choose, the most popular

ones were nonsurgical, noninvasive ways of treatment. These include lip augmentation with botulinum toxin or hyaluronic acid for obtaining the fullness effect and masking the gingival defect. Other options are represented by injecting the same substance in some key areas such as bilaterally in the elevator muscles of the upper lip and wing of the nose or instilling hyaluronic acid and botulinum toxin in the paranasal area.

A review type article that studied the effect of using the botulinum toxin as a treatment method for the high smile, included a total of 105 papers with studies carried out only on patients between the years 2013-2020. From these, 6 articles were selected to conclude the following aspects: the use of botulinum toxin is a very fast and efficient method of treatment with a decrease of 5 mm of excessive tissue. The best results were shown 2 weeks after the treatment and lasted for approximately 3 months or more [24].

To correctly manage a gingival smile, it is important to know the etiology of it. A study conducted by Roe et al. concludes that the length of the lips and their higher rate of mobility are the central etiological factors [25]. Peck et al. stated that the exposure of teeth and gums depends on the integrated effects of several factors such as increased muscle capacity, vertical maxillary excess, a larger gap between the lips in the resting position, and the amount of overjet and overbite [26]. Pausch et al. mentioned that the abnormal appearance of the maxillary teeth can take place due to many anatomical or functional factors either hereditary or inborn [27]. Dental plaque and drugs can also lead to an abnormal gingival display. The parameters assessed in this direction include the evaluation of oral hygiene and the medical history, the examination of the periodontal status, lips, teeth, and facial analysis from frontal and lateral view [28].

Regarding the multifactorial etiology of the gingival smile, the most frequent causes are hypermobility and the short length of the upper lip, the alteration of the passive eruption, gingival hyperplasia, vertical maxillary excess, and dentoalveolar extrusion [29]. To diagnose the modified passive eruption, it is important to exclude a hypermobile lip and to verify the

localization of the enamel cement junction [30]. Hormonal changes during pregnancy and the use of oral contraceptives have been associated with gingival growth [31].

The use of the botulinum toxin as an invasive and painless method of treatment is an optimal variant in case of a hyperactive upper lip [32]. Another substance that can be used is hyaluronic acid. A study was carried out in Sao Paulo, Brazil on a healthy 36-year-old man with weak bone support in the anterior region of the maxilla. It was concluded that lip augmentation can be an efficient method of treatment with durable and pleasant results. However, literature does not offer enough information regarding this subject, thus further research on this can be carried out [33]. Ozone therapy has been reported to be a safe and efficient method of treatment in the first three weeks after the gingivectomy and gingivoplasty procedures. Its beneficial effects on postoperative lesions have been reported throughout literature [34].

## Conclusions

Dentistry students are very interested in discovering the secrets of obtaining an ideal smile, hence, excessive showing of the gums is believed to be unesthetic rather than a sign of youthfulness.

The young generation of future dentists is not affected by having a gummy smile and is not tilted towards hiding it when in public. Even if much of their self-esteem is not affected, most students feel uncomfortable about it.

Consciousness and education regarding the treatment methods of a gummy smile are still necessary to be addressed amongst future dental practitioners.

**Conflict of interest:** None to declare.

## References

- Migueli D, Bruno PA, Matheus N, Micheline ST. Perception of dentists, dental students and patients on dentogingival aesthetics. *Rev Odontol Unesp*. 2018;47:92-97.
- Kaya B, Uyar R. The impact of occlusal plane cant along with gingival display on smile attractiveness. *Orthod Craniofac Research*. 2016;19:93-101.
- Kenneth W. Aschheim, Barry G. Dale. *Esthetic Dentistry - A clinical approach to techniques and materials*, Mosby 2nd Edition, Missouri, 2001, 1-595.
- Pinzan-Vercelino CRM, Costa ACS, Ferreira MC, Bramante FS, Fialho MPN, Gurgel JA. Comparison of gingival display in smile attractiveness among restorative dentists, orthodontists, prosthodontists, periodontists, and laypeople. *J Prosthet Dent*. 2020;123:314-321.
- Sriphadungporn C, Chamnannidiadha N. Perception of smile esthetics by laypeople of different ages. *Prog Orthod*. 2017;18:1-8.
- Magne P, Salem P, Magne M. Influence of symmetry and balance on visual perception of a white female smile *J Prosthet Dent*. 2018;120:573-82.
- Dawson P. Determining the determinants of occlusion. *Int J Periodontics Restorative Dent*. 1983;3:8-21.
- Ackerman MB, Ackerman JL. Smile analysis and design in the digital era. *J Clin Orthod*. 2002;36:221-36.
- Manjula WS, Sukumar MR, Kishorekumar S, Gnanashanmugam K, Mahalakshmi K. Smile: A review. *J Pharm Bioallied Sci*. 2015;7:271-275.
- Bhuvaneshwaran M. Principles of smile design. *J Conserv Dent*. 2010;13:225-32.
- Davis NC. Smile design. *Dent Clin North Am*. 2007;51:299-318.
- Tauheed S, Zafar UI, Erum BK, Sohaib H, Hassan AR et al. Macro, Mini and Micro-Esthetics: An Evaluation of Orthodontically Treated Patients, Pakistan *Orthod J*. 2021;13:81-89.
- Diaspro A, Cavallini M, Piersini P, Sito G. Gummy Smile Treatment: Proposal for a Novel Corrective Technique and a Review of Literature. *Aesth Surg J*. 2018;38:1330-1338.
- Lazarescu F. *Incursiune în estetica dentară*. Editura Medicală. București. 2013:1-363.
- Frush JP, Fisher RD. The dynesthetic interpretation of the dentogenic concept. *J Prosthet Dent*, 1958;8:558-81.
- Montevecchi M, Desimini FP, Sforza N, Bagattoni S, Piana G. Role of dental training and distance of the observer on the perception of apically shifted gingival margin with increased vertical tooth size in the esthetic zone. *Clin Exp Dent Res*. 2023;9:171-176.
- Farahani A, Jafari K, Hemmati A, Naghizadeh A, Nemati R, Farahani MH. Assessment of the Relationship Between Facial and Dental Midlines with Anatomical Landmarks of the Face and Oral Cavity. *Turk J Orthod*. 2019;32:200-206.
- Sabbah A. *Smile Analysis: Diagnosis and Treatment Planning*, Dental Clinics of North America. 2022;66:307-341.

19. Basel M, Natthamet W. Gummy Smile: A Review of Etiology, Manifestations, and Treatment, *Siriraj Medical Journal*. 2019;71:168-174.
20. Aroni MAT, Pigossi SC, Pichotano EC, de Oliveira GJPL, Marcantonio RAC. Esthetic crown lengthening in the treatment of gummy smile, *Int J Esthet Dent*. 2019;14:370-382.
21. Yoshioka N, Fernandez-Miranda JC. Nerve to the zygomaticus major muscle: An anatomical study and surgical application to smile reconstruction. *Clinical Anatomy*. Epub. 2023;1-7.
22. Nebras A. Esthetic Smile Perception Among Dental Students at Different Educational Levels. *Clin Cosmet Investig Dent*. 2021;13:163-172.
23. Negruțiu BM, Moldovan AF, Staniș CE, Pusta CTJ, Moca AE, Vaida LL et al. The Influence of Gingival Exposure on Smile Attractiveness as Perceived by Dentists and Laypersons. *Medicina*. 2022;58:1265:1-9.
24. Razmaitė A, Trakinienė G. The effect of botox for the correction of the gummy smile: A systematic review. *Stomatologija*. 2021;23:63-68.
25. Roe P, Rungcharassaeng K, Kan JYK, Patel RD, Campagni WV, Brudvik JS. The Influence of Upper Lip Length and Lip Mobility on Maxillary Incisal Exposure. *Am J Esthet Dent*. 2012; 2:116-125.
26. Peck S, Peck L, Kataja M. The gingival smile line. *Angle Orthod*. 1992;62:91-100.
27. Pausch NC, Katsoulis D. Gender-specific evaluation of variation of maxillary exposure when smiling. *J Craniomaxillofac Surg*. 2017;45:913-20.
28. Melina B, Dallel I. Excessive Gingival Display. Treasure Island (FL), Stat Pearls Publishing 2023.
29. Alshammery D, Alqhtani N, Alajmi A, Dagriri L, Alrukban N, Alshahrani R et al. Non-surgical correction of gummy smile using temporary skeletal mini-screw anchorage devices: A systematic review. *J Clin Exp Dent*. 2021;13:717-723.
30. Robbins JW. Differential diagnosis and treatment of excess gingival display. *Pract Periodontics Aesthet Dent*. 1999;11:265-272.
31. Nascimento MM, Tiboni F, dos Santos FS, Verbicaro T, Deliberador TM, Scariot R, et al. Surgical correction of vertical maxillary excess associated with mandibular selfrotation. *RSBO*. 2017;14:56-61.
32. Dym H, Pierre R. Diagnosis and Treatment Approaches to a "Gummy Smile". *Dent Clin North Am*. 2020;64:341-349.
33. Germani Vieira M, Rogerio V, Roschel P, Rabelo V, Teixeira T, Muñoz-Lora VRM. Myomodulation using hyaluronic acid fillers as an efficient and innovative treatment for gummy smile: A case report. *J Oral Biol Craniofac Res*. 2022;12:376-380.
34. Pujitha G, Joann PG. Comparative Evaluation of the Effects of Low-Level Laser Therapy and Ozone Application on Wound Healing After Gingivectomy and Gingivoplasty: A Randomized Control Clinical Trial. *Int J Dent Research*. 2023.8:4-11.

**Corresponding author:**

Ana-Petra Lazăr

George Emil Palade University of Medicine, Pharmacy, Science and Technology of Târgu Mureș, 38 Gheorghe Marinescu street, Târgu Mureș, 540139, Romania

Email: [ana.lazar@umfst.ro](mailto:ana.lazar@umfst.ro)

Received: November 14, 2023 / Accepted: December 10, 2023