



"DIAGNOSTIC APPROACHES TO GUMMY SMILE: A COMPARATIVE EVALUATION OF THE DALIA EL BOKLE AND SEIXAS SCHEMES"

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ABSTRACT

Background: Excessive gingival display (gummy smile) is an esthetic concern with multifactorial causes. Precise diagnosis is critical for treatment planning. **Methods:** Patients aged 20–30 years were evaluated using the Seixas checklist (2011) and the El-Bokle scheme (2022). The former applied qualitative clinical observations, while the latter used sequential clinical and cephalometric analyses to quantify etiologies. **Results:** The Seixas checklist functioned as a simple screening method but lacked diagnostic depth. The El-Bokle scheme provided reproducible and comprehensive assessments, enabling accurate localization and quantification of contributing factors. **Conclusion:** The El-Bokle scheme demonstrated greater diagnostic precision and clinical relevance, making it a superior tool for individualized evaluation and management of gummy smile.

KEYWORDS : Gingival display, smile esthetics, orthodontic diagnosis, cephalometry, treatment planning

INTRODUCTION

The smile is an element of significant importance in facial esthetics. A well-balanced smile is important for self-esteem and social integration. Hence, achieving a harmonious smile has become one of the main goals of orthodontic treatment. In a normal smile, the upper lip is elevated to reach the gingival margin of the maxillary central incisors exposing little or no gingival display (GD).^{1,2} Excessive gingival exposure leads to what is commonly known as a "high gingival" or "gummy smile."³ There is no consensus on the amount of excessive gingival display (EGD) that constitutes a gummy smile (GS).⁴ A relatively wide range of 1–4mm has been reported by various investigators for normal GD.^{5–12} EGD or GS can severely alter facial esthetics. According to Kokich et al,¹¹ a smile is considered unesthetic by both clinicians and laypeople when gingival exposure reaches 4 mm. The prevalence of GS is 10% among the population aged between 20 and 30 years and has been reported to affect females twice as much as males.¹³ Multiple etiologies can be simultaneously responsible for a GS, identifying the extent of each etiology is essential for selecting the most appropriate therapy. Previously introduced diagnostic schemes for GS have shown deficiencies,^{16,17} as most have failed to discern the amount and location of a gummy smile or acknowledge the possibility of a mixed etiology.^{6,18} This article aims to find out a reliable sequential diagnostic scheme for GS comparing recent diagnostic Scheme by *Dalia El-bokle* and previous diagnostic scheme by *Mayra Reis Seixas* to identify the location and amount of GS and quantify the contributions of its accountable etiologies in Kannur population. And objectives are to identify a reliable diagnostic scheme for GS, to identify the location of GS, to identify the amount of GS, to quantify the contributions of its accountable etiologies in Kannur population.

MATERIALS AND METHODS

The study was carried out on patients who reported to the Department of Orthodontics and Dentofacial Orthopaedics, Kannur Dental College, Kannur, Kerala. Patients within the age range of 20 to 30 years were included in the sample. A total of 10 subjects, comprising both males and females, were selected. The presence of gummy smile was assessed using two diagnostic schemes: the recent method proposed by *Dallia El-Bokley* (2022) and the earlier checklist developed by *Mayra Reyes-Sexas* (2011). The required clinical parameters were measured and the data were analyzed to determine which of the two diagnostic approaches demonstrated greater reliability in identifying gummy smile.

Inclusion Criteria Were:

adult patients aged 20–30 years; patients with Class I or Class II skeletal relationship; patients with Class I or Class II molar relationship; patients presenting with mild crowding (1–3 mm) as determined by Little's Irregularity Index; and patients without missing teeth within the specified age range.

Exclusion Criteria Were:

patients with severe crowding; patients with missing teeth inconsistent with the age group; patients with a history of facial surgery or facial trauma; and patients with mental retardation.

1. Diagnostic scheme by *Dalia El-bokle*:

Step 1: Measure the amount of EGD clinically during a full smile: The amount of GD is measured clinically using a small millimetric ruler or digital calipers during a full smile. From the zenith point of each tooth to the lower border of the upper lip.

Step 2: Assess The Length Of The Upper Lip During Rest: Measured clinically from the base of the nose "subnasale" to the inferior border of the lip "stomium" at both the philtrum and commissures.

Step 3: Assess Upper Lip Mobility/elevation During A Full Smile: Mobility(M) = Upper lip length at rest(A) – upper lip length at full smile(S)
Percent mobility(M%) = $M/A \times 100$
Hypermobility(HM) = $M\% - 27 \times A$
This value is compared with the average percentile elevation (27%)

Step 4: Assess Maxillary Incisor Length And Measure Gingival Sulcus Depths For The Maxillary Teeth: The crown length of the maxillary central incisor = width/length.

The depths of the gingival sulci of all maxillary teeth with GD are measured using a periodontal probe.

Step 5: Assess The Maxillary Incisors' Vertical Position And Inclination: The vertical distance between the incisal edge of the maxillary incisors and the functional esthetic occlusal plane is measured on the cephalometric tracing. Maxillary incisor inclination (SN-U1) is measured

Step 6: Assess The Vertical Maxillary Position: VME is

assessed cephalometrically using the maxillary height angle (N-FC-A), developed to study malocclusion in patients using Ricketts $56^{\circ} \pm 3^{\circ}$

Step 7: Calculate The Contributions Of The Various Possible Etiologies: Use the measurements from the previous steps to calculate the contributions of etiologies (Steps 2-5) by comparing the measured values with ideal values.

Any unaccounted increase in gingival display is attributed to VME.

2. Diagnostic scheme by Máyla Reis Seixas

1. Interlabial Distance At Rest: When entering this information, it is crucial that orthodontists include in the initial orthodontic records a photograph showing the patient's lips at rest. Phonetic assessments based on video footage can also prove useful.

1-3 mm, >3 mm

2. Upper Incisor Exposure During Rest And Speech: one can use a standard lateral cephalometric radiograph of the lips at rest and measure the distance in millimeters between the incisal edge of the maxillary central incisor and the lower contour of the upper lip.

<1 mm, 1-4.5 mm, >4.5 mm

3. Smile Arc: The term smile arc is defined as the curvature formed by the incisal edges of anterosuperior teeth. To be considered an esthetic and youthful smile, this curvature must be parallel to the superior margin of the lower lip. Pleasant, Flat, reverse

4. Width/length Ratio Of Maxillary Incisors: <65, 75-80%, >85%

5. Morphofunctional Characteristics Of The Upper Lip: Short, Thin, Hypermobility

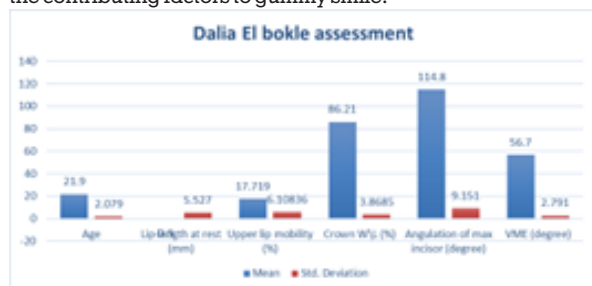
RESULTS

The present study compared the diagnostic efficiency of two schemes - Dalia El Bokle and Mayre Reis Seixas - in evaluating gummy smile.

Table 1. Dalia El Bokle Assessment (Selected Parameters)

	N	Minimum	Maximum	Mean	Std. Deviation
Age	10	20	26	21.90	2.879
Lip length at rest (mm)	10	-4	14	-5.90	5.527
Upper lip mobility (%)	10	4.10	24.00	17.719	6.10036
Crown W/L (%)	10	80.0	90.0	86.210	3.8685
Angulation of max incisor (degree)	10	102	134	114.80	9.151
VME (degree)	10	55	62	56.70	2.791

The Dalia El Bokle assessment (Table 1) included multiple quantitative parameters such as lip length at rest, upper lip mobility, crown width-to-length ratio, incisor angulation, and vertical maxillary excess. For example, the mean upper lip mobility was $17.72 \pm 6.11\%$, while the average crown width-to-length ratio was $86.21 \pm 3.87\%$. These detailed morphometric values provided a more objective and systematic evaluation of the contributing factors to gummy smile.



In contrast, the Mayre Reis Seixas scheme (Table 2) focused on clinical observations such as interlabial gap, incisor display, smile arc, and upper lip morphology. Findings revealed that 80% of individuals demonstrated a pleasant smile arc and 80% had normal upper lip morphology. While simple and practical, this scheme offered limited diagnostic depth compared to the more comprehensive El Bokle method.

Table 2. Mayre Reis Seixas Assessment (smile arc & lip morphology)

	N	Minimum	Maximum	Mean	Std. Deviation
interlabial gap	10	3	5	3.00	.913
upper incisor at rest	10	2	4	3.00	.913

Between the two schemes, the Dalia El Bokle diagnostic method proved to be the most effective. It provided detailed, quantifiable, and reproducible parameters, ensuring greater diagnostic accuracy and clinical relevance. In contrast, although the Mayre Reis Seixas checklist was simpler, it lacked comprehensive diagnostic value.

DISCUSSION

The diagnosis of a gummy smile (GS) continues to be a subject of significant clinical importance due to its multifactorial etiology and its profound effect on facial esthetics. A harmonious smile requires the coordinated relationship of teeth, lips, and gingiva, and any imbalance can negatively influence attractiveness and self-esteem (Hulse, 1970; Mackley, 1993)¹. Excessive gingival display (EGD), often described as a gummy smile, is perceived as unesthetic by both clinicians and laypersons when it exceeds 3–4 mm (Kokich et al., 1999)¹¹. Given its prevalence and psychosocial impact, accurate diagnosis of GS is indispensable for selecting an effective treatment strategy.

Traditionally, diagnostic schemes relied on simple observational checklists to identify features contributing to GS. Seixas et al. (2011) proposed a systematic checklist of esthetic features to aid in diagnosis and treatment planning. While this represented an important step toward structured evaluation, the checklist format primarily allowed clinicians to “flag” possible etiological factors without quantifying their relative contributions. As Oliveira et al. (2013)³ noted, the etiology of GS is often multifactorial, including vertical maxillary excess (VME), short upper lip, hyperactive lip musculature, altered passive eruption, and dentoalveolar extrusion. Thus, relying on a qualitative checklist alone risks oversimplifying diagnosis and limiting the precision of treatment planning.

Recognizing these limitations, El-Bokle and Ghany (2022)¹⁹ introduced a sequential seven-step diagnostic protocol that addresses the need for quantification and localization of etiological factors. This scheme incorporates both clinical and cephalometric analyses. Critical parameters such as lip length and mobility, crown length, gingival sulcus depth, incisor inclination and position, and vertical maxillary height are systematically assessed. Importantly, the scheme allows calculation of the proportional contribution of each etiological factor, attributing any residual gingival display to VME. This quantitative aspect differentiates it from earlier diagnostic approaches and ensures a more comprehensive understanding of each patient's condition.

The present comparative study conducted in the Kannur population reaffirms the superiority of the El-Bokle scheme over the Seixas checklist. Whereas the Seixas approach provided only a general indication of possible etiologies, the El-Bokle method yielded reproducible, objective measurements that clearly distinguished between skeletal and soft tissue contributions. This finding is consistent with Peck et al. (1992)¹⁵, who emphasized that GS often results from

the interaction of multiple variables, including vertical maxillary excess and lip elevation capacity. The El-Bokle scheme directly addresses this complexity by quantifying the interaction of soft tissue and skeletal elements, thereby improving diagnostic accuracy.

Another notable strength of the El-Bokle protocol is its applicability across both genders. Previous research has shown that gingival display is often more prevalent among females (Geron & Atalia, 2005)⁵, with lip dynamics varying by sex. By including parameters such as lip length and elevation percentage, the El-Bokle method accounts for these biological differences, making it equally reliable in male and female patients. This enhances the universality of the scheme and minimizes diagnostic bias. From a clinical perspective, the adoption of El-Bokle's method has direct implications for treatment planning. Accurate localization of etiologies allows clinicians to tailor interventions precisely. For example, cases dominated by altered passive eruption may benefit from periodontal crown lengthening (Pinto et al., 2015)⁹, while those with significant VME may require orthognathic intervention (Jananni et al., 2014). Similarly, patients with hyperactive lips may be managed with botulinum toxin or lip repositioning procedures (Bhola et al., 2015)⁶. Without such precise differentiation, treatment risks being generalized, potentially leading to suboptimal esthetic outcomes.

In summary, the findings of this study, supported by the literature, indicate that the sequential diagnostic scheme of El-Bokle and Ghany (2022) provides a more comprehensive, quantifiable, and clinically applicable framework for diagnosing GS than the checklist-based method of Seixas et al. (2011)¹⁶. The ability of El-Bokle's scheme to identify both the location and magnitude of gingival display, as well as to apportion the etiological contributions, enhances diagnostic accuracy and facilitates individualized treatment planning. Thus, it may be considered the preferred diagnostic tool for gummy smile evaluation in clinical orthodontics.

CONCLUSION

The comparative analysis indicates that the diagnostic scheme of Dalia El-Bokle is superior to the Seixas checklist, as it provides a more systematic and quantifiable assessment of gummy smile. This makes it a more reliable tool for accurate diagnosis and effective treatment planning.

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