



## A Comprehensive Review on Indices of Gingival Enlargement

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### Abstract

Gingival enlargement is the common featuring gingival diseases. A perfect diagnosis enables to rule out the differential diagnosis based on their presentations. Quantitative measurement of disease is based on indices system. An efficient index should be quick and easy to use, with minimal instrumentation. There are numerous aetiologies for gingival overgrowth or gingival enlargement which affect. Hence we need to know various methodologies to measure all the parameters for a successful means of treatment. Most common method of assessment of the gingival enlargement is with a suitable index. This paper reviews the commonly used indices for diagnosing gingival enlargement.

**Keywords:** Gingival Overgrowth; Indices; Gingival Enlargement

### Introduction

Gingival enlargement is the proliferation and intensification of the gingiva which is an important feature of a gingival disease. An index is a numerical value describing the relative status of the population on a scale with definite upper and lower limits. Various mechanisms have been described by the investigators in the etiopathogenesis of gingival overgrowth. In inflammatory gingival overgrowth, the microorganisms produces certain toxic substances like collagenases, hyaluronidase, chondroitin sulphate, proteases etc which cause damage to the epithelium & connective tissue along with intercellular components leading to widening of small capillaries and venules with formation of capillary loops between retepegs. Gingival enlargement or gingival hyperplasia is an abnormal overgrowth or increase in the size of the gingival tissues. Gingival enlargement is classified into different types according to their etiologic cause. To measure the intensity of the presenting clinical signs and symptoms which differs from persons to persons indices have been proposed.

The clinical features can be assessed invasively and non – invasively.

#### Gingival indices

##### Angelopoulos and Goaz index (1972)

Described an index for measuring the vertical component of gingiva. Three grades based on the enlargement covering the clinical crown were described as.

##### Seymour index (1985)

Seymour graded gingival enlargement on the study casts. He divided upper and lower anterior segments 5 gingival units each both buccally and lingually. The degree of gingival enlargement and their encroachment upon adjacent teeth were recorded.

Grade	Features
Grade 0	No hyperplasia; normal gingiva The hyperplastic gingiva covered
Grade 1	The cervical third or less of the anatomic crowns of the anterior teeth
Grade 2	The hyperplastic gingiva extended anywhere in the middle third of the anatomic crowns of the anterior teeth
Grade 3	The hyperplastic gingiva covered more than two third of the anatomic crowns of their anterior teeth

**Table 1**

	Gingival enlargement grade
0	Normal
1	Thickening from the normal up to 2mm
2	Thickening from the normal greater than 2mm

**Table 2**

### McGaw index (1987)

McGaw assessed gingival overgrowth using a modification of the semi – quantitative index developed by Aas and divided the patients into 2 groups, responders and non – responders (gingival overgrowth score of grade 1 or less).

Grade	Criteria
0	No overgrowth; feather edged gingival margin
1	Blunting of gingival margin
2	Moderate gingival overgrowth (<1/3 <sup>rd</sup> of crown length)
3	Marked gingival overgrowth (>1/3 <sup>rd</sup> of the crown length)

**Table 3**

### Drew index (1987)

Drew measured gingival hyperplasia extent on Kodachrome slides and study casts.

### Heijl and Sundin index (1988)

Heijl and Sundin used color photographs to assess signs of gingival overgrowth. For each tooth, changes in gingival size were determined according to a Gingival Size Index (GSI), in which the gingival tissues of the mesial, buccal, and distal surfaces of the teeth were evaluated.

Score	Features
0	Gingiva exhibited no clinical signs of hyperplasia
1	Minimal hyperplasia; increase in density of the gingiva with marked stippling and granular appearance
2	Moderate hyperplasia; an increase in the size of the interdental papilla and noticeably rolled gingival margins.
3	Marked hyperplasia; encroachment of the gingival tissues upon the anatomic crown of the crown.
4	Hyperplasia so severe as to interfere with function.

**Table 4**

Score	Gingival changes
0	No change in size from the initial examination
1	Small but clinically evident size increase
2	marked increase
3	Extensive increase with the gingival tissues covering the corresponding aspect of the tooth surface and/or with deep clefts into the enlarged gingiva

**Table 5**

### King GN, et al. index (1993)

King GN, *et al.* (1993) [1] established a gingival enlargement index while conducting the study on renal allograft recipients who were on cyclosporine A and calcium antagonists. In this study the gingival hyperplasia was evaluated using a hyperplastic index (HI). The vertical extension of the HI index was assessed in an apico-coronal direction and was scored by using a 4-point interval scale as given below:

- **Grade 0:** No gingival hyperplasia
- **Grade 1:** Mild hyperplasia (blunting of gingival margin)
- **Grade 2:** Moderate hyperplasia (less than 1/2 of crown length)
- **Grade 3:** Marked hyperplasia (greater than 1/2 of crown length)

The horizontal component (labio-lingual) of HI was measured by using Seymour, *et al.* [2] method on both labial and lingual aspects and scored as:

- **Grade 0:** Normal width of free gingival margin
- **Grade 1:** Thickening from the normal up to 2mm.
- **Grade 2:** Thickening from the normal > 2mm

### Eva and Ingles index (1999)

Eva and Ingles (1999) [3] 17 introduced a new index for measuring gingival overgrowth caused due to drugs. In this index for standardization, the buccal and lingual papillae were scored separately. The criteria by which scores were divided are as mentioned below:

- **Grade 0:** No overgrowth, firm adaptation of the attached gingiva to the underlying alveolar bone. There is slight stippling; there is no granular appearance. A knife-edged papilla is present toward the occlusal surface and no increase in density or size of the gingiva.
- **Grade 1:** Early overgrowth, as evidenced by an increase in density of the gingiva with marked stippling and granular appearance. The tip of the papilla is rounded and the probing depth is less than or equal to 3mm.
- **Grade 2:** Moderate overgrowth, manifested by an increase in the size of the papilla and/or rolled gingival margins. The contour of the margin is still concave or straight. Also the enlargement has a buccolingual dimension of up to 2mm, measured from the tip of the papilla outward. The probing depth is equal to or less than 6mm and the papilla is somewhat retractable.
- **Grade 3:** Marked overgrowth, represented by encroachment of the gingiva onto the clinical crown. Contour of the margin is convex rather than concave. The enlargement has a buccolingual dimension of approximately 3 mm or more, measured from the tip of the papilla outward. The probing depth is greater than 6mm and the papilla is clearly retractable.
- **Grade 4:** Severe overgrowth, characterized by a profound thickening of the gingiva. A large percentage of the clinical crown is covered. The papilla is retractable, the probing depth is greater than 6 mm and the buccolingual dimension is approximately 3 mm.

### Miranda and Brunet index (2001)

Described an index in which horizontal measurement of the enlargement is possible. This index is also termed as nodullary papilla index. In this index the measurement is carried out with the help of a periodontal probe from the enamel surface of the interdental contact point to the outer papillary area. The scores of this index is as mentioned below:

- Score 0: Papilla thickness < 1 mm
- Score 1: Papilla thickness 1- 2 mm
- Score 2: Papilla thickness > 2 mm

### Conclusion

Various gingival overgrowth indices have been proposed for accurate measurement of the enlarged tissue to draw conclusions regarding severity of the enlargement and the treatment accordingly. However, the prognosis of the involved tissue depends on both horizontal and vertical components of the enlargement which was missing in most of the indices described in this review. Additionally a detailed description of the complete periodontium and other factors should be incorporated as described in the index given by Eva and Ingles which will facilitate proper treatment approach for the diseased tissue. Also variations exist between subjects in terms of etiological factors for which King divided the subjects into responders and non responders for drug induced gingival enlargement which additionally helps to categorize the patients properly for carrying out the studies on large scale. Variety of methods have been employed to determine the severity of gingival enlargement, and this has resulted in uncertainty with regard to the prevalence of this side effects [4-10].

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