

## ORIGINAL RESEARCH

# Evaluation and Comparison of Clinical Biologic Width in Subjects with Healthy Periodontium, Chronic Generalized Periodontitis, and Generalized Aggressive Periodontitis - A Clinicoradiographical Study

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## ABSTRACT

**Introduction:** Clinical biologic width (BW) is defined as the distance from the most coronal level of the clinical attachment level (CAL) to the crestal bone level. The progression of periodontal destruction is generally considered to be chronic in nature and slowly progressing. However, under certain circumstances, disease progression may be more aggressive, resulting in severe bone and attachment loss at an early age. Very few studies have been done on the measurement of BW in humans with clinically diagnosed periodontitis.

**Aim and Objective:** The objective of the study was to evaluate and compare the clinical BW in subjects with healthy periodontium, chronic generalized periodontitis (CGP), and aggressive periodontitis, clinically and radiographically.

**Materials and Methods:** Subjects between the age group of 20 and 45 years were screened. About ten subjects with healthy periodontium, ten subjects with CGP, and ten subjects with aggressive periodontitis were selected according to the following criteria: 1. Group 1 – Healthy periodontium - subjects having  $\geq 20$  teeth with  $\geq 30\%$  of measured sites with  $\leq 3$  mm pocket depth (PD),  $\leq 3$  mm CAL, and no bleeding on probing 2. Group 2 – CGP – subjects having  $\geq 20$  teeth with  $\geq 30\%$  of measured sites with  $\geq 5$  mm of PD and  $\geq 3$  mm CAL 3. Group 3 – Aggressive periodontitis – generalized attachment loss in at least 3 permanent teeth other than first molars and incisors. Six index teeth were selected for the assessment of BW. Each tooth was evaluated for BW at six sites. The mean of the six sites was considered as average BW for the particular tooth. The mean BW per group was compared with the control group.

**Results:** The mean BW values in the healthy group were statistically greater than CGP and aggressive periodontitis groups ( $P < 0.05$ ). In the chronic and aggressive periodontitis groups, there was a statistical inverse correlation between the clinical parameters (PD and CAL) and the BW, wherein increased PD and CAL were noted in groups 2 and 3 with reduced BW values as compared to the healthy control group.

**Conclusion:** The mean clinical BW in subjects with healthy periodontium seemed to be significantly greater than CGP and aggressive periodontitis. The assessment of BW should be routinely analyzed before formulating the treatment protocols. The role of BW in prognosis and its importance in restorative dentistry and various clinical scenarios require attention for further research.

**Keywords:** Biologic width, Periodontitis, Radiographic.

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**Conflicts of interest:** None

## INTRODUCTION

The interface and zone of attachment between the gingival and enamel or cementum of tooth is made up of a fibrous, supracrestal connective tissue, and an epithelial attachment (junctional epithelium), and its aspects have been portrayed precisely from autopsy jaw specimens by Gargiulo *et al.*<sup>[1,2]</sup> "Biologic width" (BW) is the supracrestal attachment of the periodontal tissues to the tooth/root surface and was given as a concept in periodontics and restorative dentistry.<sup>[3]</sup> The autopsy specimens of subjects 19–50 years of age were used for comprehensive evaluation of the histologic aspects of the BW on teeth. The results had an average width of 1.07 mm for connective tissue and 0.97 mm for the junctional epithelium. These aspects diverge a notably large amount with age and apical shift of the epithelial tissue.<sup>[1,2]</sup> According to Gargiulo *et al.* in 1985,<sup>[4]</sup> the mean values received from these studies do not actually reflect the divergence that remains in the measurements of the junction between gingival and enamel or cementum. Furthermore, it was advised that the dimensions of BW procured from tissues of a healthy periodontium should not be extended for pathological use.<sup>[4]</sup>

The developing destruction of the periodontium is usually contemplated of being chronic in nature and slowly advancing. However, in few situations, spread of

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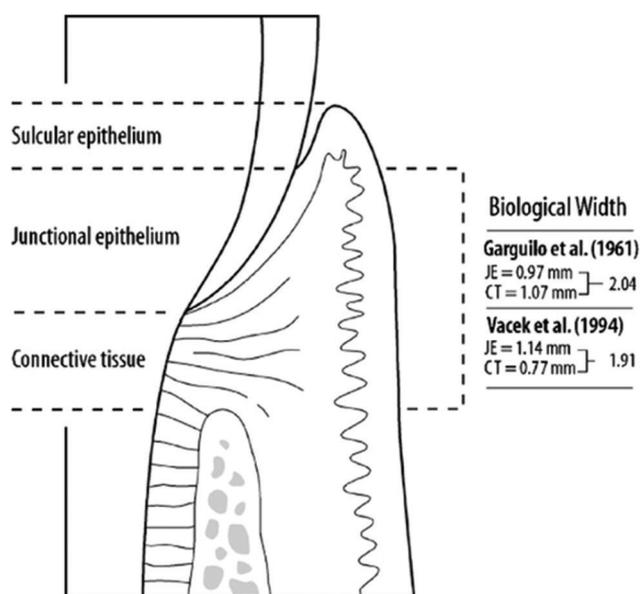
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the disease may be more aggressive following extreme bone and attachment loss at a young age.<sup>[5]</sup> Studies been done on the measurement of BW in humans with clinically diagnosed periodontitis is quite a few.

Frequent pathologic changes in periodontium, interaction between bacteria and host affected by environmental or acquired risk factors, e.g., in smokers and systemically compromised individuals, and individuals showing altered inflammatory genotype cause further aggravated disease.<sup>[5]</sup>

Clinical BW is defined as the distance from the most coronal level of the clinical attachment level (CAL) to the crestal bone level (CBL). The term biological width was based on the work of Gargiulo *et al.*, who described the dimensions and relationship of the dentogingival junction in humans. They reported the following mean dimensions: A sulcus depth of 0.69 mm, an epithelial attachment of 0.97 mm, and a connective tissue attachment of 1.07 mm.<sup>[6]</sup>

Although noteworthy divergence may take place in BW, an average value of 2.04 mm is considered to be the norm in most of the teeth in most of the patents.<sup>[1,2,4]</sup>



## Aim and Objective

The purpose of this study was to evaluate and compare the clinical BW in subjects with healthy periodontium, chronic generalized periodontitis (CGP), and aggressive periodontitis, clinically and radiographically.

## MATERIALS AND METHODS

The present study was conducted on 10 patients with healthy periodontium and 10 subjects with CGP and 10 with generalized aggressive periodontitis visiting in the Department of Periodontics, Jaipur Dental College,

Jaipur, Rajasthan, India. The study design was explained to the patients, and informed consents were obtained. The project was approved by the Ethical Committee at Jaipur dental college, Jaipur.

The inclusion criteria were subjects between the age group of 20–45 years. Subjects having  $\geq 20$  teeth with  $\geq 30\%$  of measured sites with  $\leq 3$  mm CAL and no bleeding on probing were considered healthy. Subjects having  $\geq 20$  teeth with  $\geq 30\%$  of measured sites with  $\geq 5$  mm pocket depth (PD) and  $\geq 3$  mm CAL were considered CGP. Subjects having generalized attachment loss in at least three permanent teeth other than first molars and incisors were considered generalized aggressive periodontitis. Subjects were excluded from participating in the study if they had received antibiotic therapy 3 months before study or nonsurgical periodontal therapy 3 months before the study or received surgical periodontal therapy 12 months before study. Pregnant and lactating females and subjects with systemic diseases and conditions and subjects with crowns or fixed partial dentures were excluded from the study.

Each subject received a clinical examination by a calibrated examiner consisting of full-mouth recording of PDs and CALs at each tooth for the six sites for all fully erupted teeth, except third molars, using a University of North Carolina 15 probe with measures rounded up to the nearest millimeter. Radiographs were taken using radiovisiography for each index tooth, and digital radiographs were compared to measure the (CBL - that is the distance from cementoenamel junction [CEJ] to the alveolar crest) on proximal surfaces using computerized software. Clinical BW is defined as the distance from the most coronal level of the CAL to the CBL. As CEJ is used to calculate CAL and CBL, clinical BW was calculated by subtracting the CAL from CBL.

## Statistical Analysis

Results are expressed as mean  $\pm$  standard deviation and range values. One-way ANOVA test was used for inter-group comparisons for independent samples.  $P = 0.05$  or less was considered for statistical significance. The statistical analysis was conducted by the mean of SPSS Version 19.

## DISCUSSION

On statistical analysis, the mean BW in group 1 (Healthy) was greater than group 2 (CGP) and group 3 generalized aggressive periodontitis (GAP) ( $P < 0.05$ ).

BW is essential for preservation of periodontal health. Adequate biological width protects the tooth from inflammatory changes and progression from health to disease. Hence, in the current study, the mean BW was greater in health as compared to CGP and GAP.

Results go in agreement with studies done by Rajesh *et al.*; who found a mean clinical biological width of 2.36 mm in healthy subjects versus the mean clinical biological width of 1.92 mm in chronic periodontitis subjects. Furthermore, the histological BW was found to be 2.04 mm.<sup>[7]</sup>

Novak *et al.* who conducted a similar study found that the mean clinical BW was 3.95 mm versus the mean histologic BW of 2.04 mm.<sup>[8]</sup>

In group 2 (CGP) and 3 (GAP), there was a statistical inverse correlation between the clinical parameters (PD, CAL), wherein increased PD and CAL were noted in groups 2 and 3 with reduced BW values as compared to healthy control group.

The BW has been noted to be violated due to inflammatory conditions such as periodontal diseases and improper prosthesis.<sup>[9]</sup>

Violated BW can result in uncontrolled bone resorption and might grow over the quantity of the bone necessary for the insertions of the connective tissue attachment on the tooth root. The result is advanced periodontitis.<sup>[10]</sup>

## CONCLUSION

The mean clinical BW in subjects with healthy periodontium seemed to be significantly greater than CGP and GAP. The assessment of BW should be routinely analyzed before formulating the treatment protocols. The role of BW in prognosis and its importance in restorative

dentistry and various clinical scenarios require attention for further research.

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