Prevalence of Angular Bone Defects in Chronic Periodontitis Patients with and without Systemic Diseases

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Abstract

The aim of the current study was to assess the distribution of angular defects in both maxillary and mandibular arches in chronic periodontitis patients with and without systemic diseases. This retrospective study was conducted among 200 patients who reported to Saveetha Dental College and Hospitals, Chennai from June 2019 to March 2020. A total of 200 chronic periodontitis patients were enrolled and assessed for number of angular bone defects using panoramic radiographs. The study participants were divided into two groups. Group 1 (n=100, 50 males and 50 females): chronic periodontitis patients with systemic diseases; Group 2 (n=100, 50 males and 50 females): chronic periodontitis patients without systemic diseases. Data regarding the number of angular defects of the study population were collected and analysed. Among 100 systemically healthy patients, 102 sites presented with angular defects. Among 100 systemically diseased patients, 320 sites presented with angular defects. In gender wise comparison, the number of angular defects were higher in females as compared to males. When the distribution of angular bone defects were compared between maxillary and mandibular arches, angular bone defects were predominantly observed in mandibular arch. Therefore, this study showed higher prevalence of angular bone defects in chronic periodontitis patients with systemic diseases (320 sites) as compared to the ones without systemic diseases (102 sites).

Keywords: *Periodontitis; Bone loss; Angular defects; Alveolar bone, Bone resorption*

Introduction

Chronic periodontitis is the most common inflammatory periodontal disease which leads to changes in normal architecture of the alveolar processes. Alveolar bone destruction is primarily caused by bacterial plaque that leads to inflammation of periodontal tissue. Bacterial plaque induces an increase of osteoclast formation and activity through direct or indirect mechanisms. Equilibrium between bone formation and bone resorption is thus shifted to favor the latter and results in the destruction of alveolar bone.[1–3] The possible factors in the pathogenesis of the bone defects are tooth anatomy and position, the relationship of adjacent marginal ridges and cementoenamel junctions and open contact points with resultant food impaction as well as traumatic lesions affecting the attachment apparatus.

Periodontal bone loss from periodontitis may be either horizontal or vertical, leading to the formation of defects contained within the bone. An intrabony defect may be detected by radiographic means, bone sounding, or by visual examination of the bone defects during periodontal surgery.[4–8] Angular bone defects have

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been associated with trauma from occlusion [9,10] and this association is not exclusive since angular bone loss defects are associated with teeth with normal function and in occlusion.[11–13] Most of the angular defects are due to the apical propagation of the subgingival plaque.[14–16]

Osseous defects occur either single or in different combination forms. The identification of osseous defects is clinically challenging as the osseous surgeries are based on diagnosis. The complexity of the disease grants importance to the use of imaging methods in the detection of such alterations. Radiography plays an important role in periodontal diagnosis mainly because radiographs can reveal the amount and type of damage caused to the alveolar bone.[17]

In this context, the present study was undertaken to assess the distribution of angular defects in both maxillary and mandibular arches in chronic periodontitis patients with and without systemic diseases.

Materialsand Methods

This retrospective study was conducted among 200 chronic periodontitis patients who reported to Saveetha Dental College and Hospitals, Chennai from June 2019 to March 2020. Data regarding the number of angular defects of the study population were collected using panoramic radiographs and analysed. A total of 200 chronic periodontitis patients were enrolled and assessed for number of angular bone defects using panoramic radiographs. The study participants were divided into two groups. Group 1 (n=100, 50 males and 50 females): chronic periodontitis patients with systemic diseases; Group 2 (n=100, 50 males and 50 females): chronic periodontitis patients without systemic diseases. Differential and inferential statistics were done for data summarization and presentation. The study protocol was approved by the Institutional Ethical and Review Board, Saveetha Dental College and Hospitals, Chennai.

Results and Discussion

A total of 200 chronic periodontitis patients were enrolled and assessed for number of angular bone defects using panoramic radiographs.

Among 100 systemically healthy patients, 102 sites presented with angular defects. Among 100 systemically compromised patients, 320 sites presented with angular defects. (Figure 1) In gender wise comparison, among 50 males without systemic diseases, the number of angular defects were 42. Among 50 males with systemic diseases, the number of angular defects were 120. Among 50 females without systemic diseases, the number of angular defects were 60. Among 50 females with systemic diseases, the number of angular defects observed were 200. (Figure 2) When the distribution of angular bone defects were compared between maxillary and mandibular arches, 298 sites with angular bone defects were observed in mandibular arch and 124 sites with angular bone defects were observed in maxillary arch. (Figure 3). There is a significant difference between the angular defects in systemically healthy patients and systemically compromised patients.Chi square test p value is 0.01(<0.05) which was clinically and statistically significant (Figure 4) .

The common radiographic representation of chronic periodontitis is infrabony defects which is commonly referred to as vertical or angular defects. A vertical defect is a pathologic phenomenon related to the process of irregular bone resorption seen in advanced forms of periodontal disease. Although vertical defects are considered a sign of progressive or advanced disease, their occurrence in the population has been but little investigated.[18–22]

The present retrospective study assessed the number of angular defects in chronic periodontitis patients with and without any systemic diseases. In the present study, it was observed that the number of angular defects were higher in chronic periodontitis patients with systemic diseases when compared to chronic periodontitis patients without systemic diseases.

Chapple ILC et al[23] in the consensus report of the joint EFP/AAP workshop on periodontitis and systemic diseases suggested a strong association between periodontitis and various systemic diseases and conditions. Kuo LC et al[24] conducted a systematic review to assess the inter-relationships and interactions between periodontal diseases and systemic diseases and concluded that most of the literature evaluated in the systematic review supported a modest association between periodontitis and systemic diseases.

Singh PK et al[25] demonstrated that the distribution of angular bone defects were associated with chronic

periodontitis. Albander JM et al[26] in a systematic review suggested that the systemic diseases and conditions can affect the periodontal attachment apparatus and cause loss of periodontal supporting tissues resulting in bone loss. Our finding is in accordance with the previous studies as the majority of angular bone defects were observed in chronic periodontitis patients with systemic diseases compared to the one without systemic diseases.

In the present study when gender wise comparison was done, females presented with more angular defects when compared to males. Zhao H et al[27] investigated the alveolar bone status chronic periodontitis patients using CBCT and found out that females had higher degree of bone loss when compared to males. Similarly, Kasaj A et al[28] assessed the alveolar bone loss and angular defects in panoramic radiograph and found that the majority of the bone defects were detected among females when compared to males. Our finding is in agreement with the previous study.

In the present study, when the distribution of angular bone defects were compared between maxillary and mandibular arches, the majority of the angular bone defects were observed in mandibular arch when compared to maxillary arch. In a study by Prichard J et al[29] mandibular arch showed higher number of angular defects than maxillary arch. Our finding is in line with the previous study.

The limitations of the present study is minimal sample size and the confounding factors like age, smoking, genetic factors, oral hygiene, stress were not considered. Therefore, extensive research needs to be done by considering the influence of various risk factors that aggravates periodontal destruction.

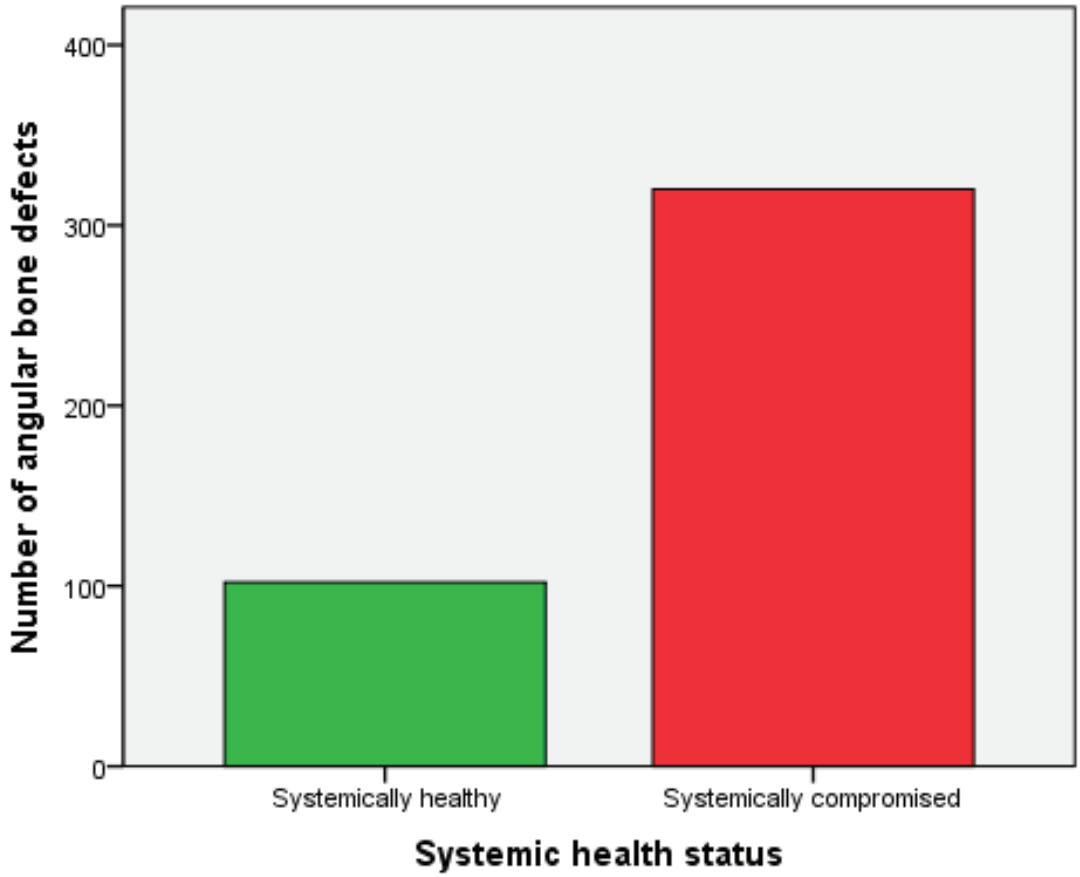

Figure 1: Bar graph representing the distribution of number of angular bone defects based on systemic health status. The X axis represents the systemic health status of the patients and the Y axis represents the number of angular defects. It was seen that the number of angular bone defects found in systemically healthy patients and in systemically compromised patients were 102 and 320 respectively.

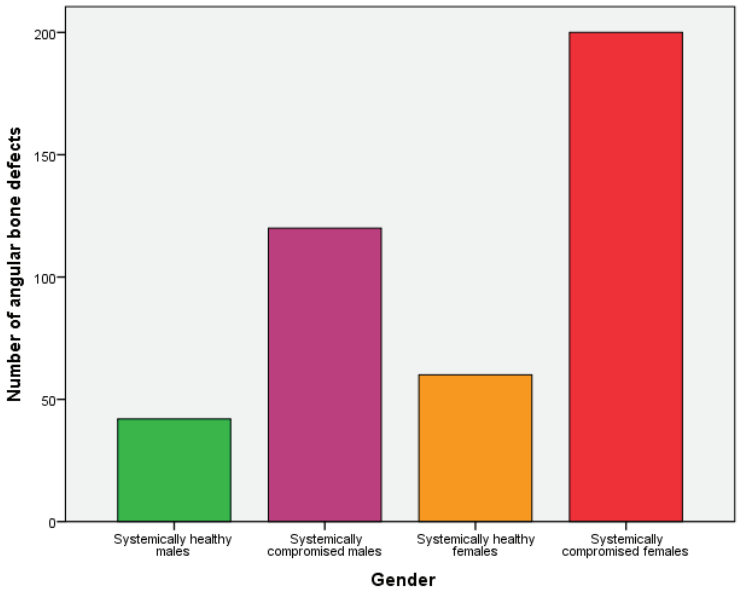

Figure 2: Bar graph representing gender wise distribution of the number of angular bone defects. The X axis represents the gender and the Y axis represents the number of angular defects. It was seen that the systemically healthy males presented 42 angular defects (green colour) and systemically healthy females presented with 60 angular defects (orange colour) and systemically compromised males presented with 120 angular defects (purple colour) and systemically compromised females presented with 200 angular bone defects (red colour). It was seen that systemically compromised females had more angular bone defects and systemically healthy males had least number of angular bone defects.

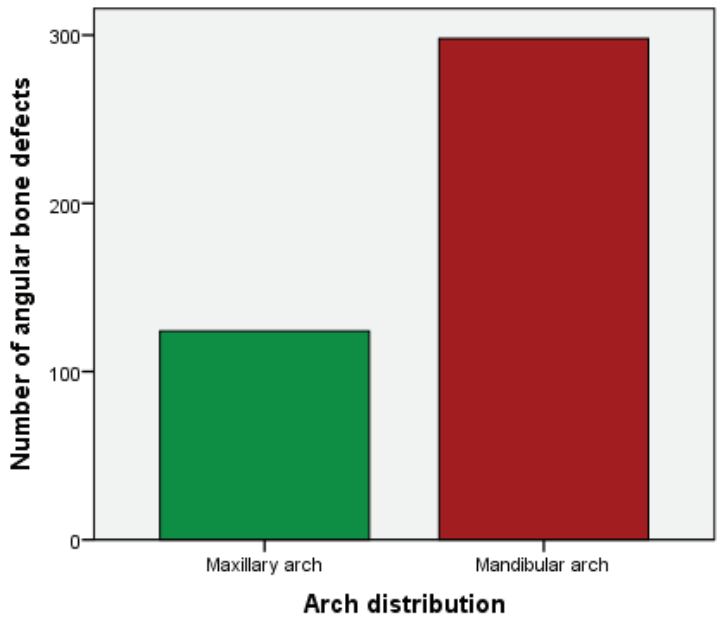

Figure 3: Bar graph representing archwise distribution of the number of angular bone defects. The X axis represents the archwise distribution and the Y axis represents the number of angular bone defects. It was seen that the maxillary arch exhibited 124 angular bone defects (dark green colour) and the mandibular arch showed 298 angular bone defects (dark red colour).Mandibular arch presented with more number of angular defects (298 sites) than the maxillary arch (124 sites).

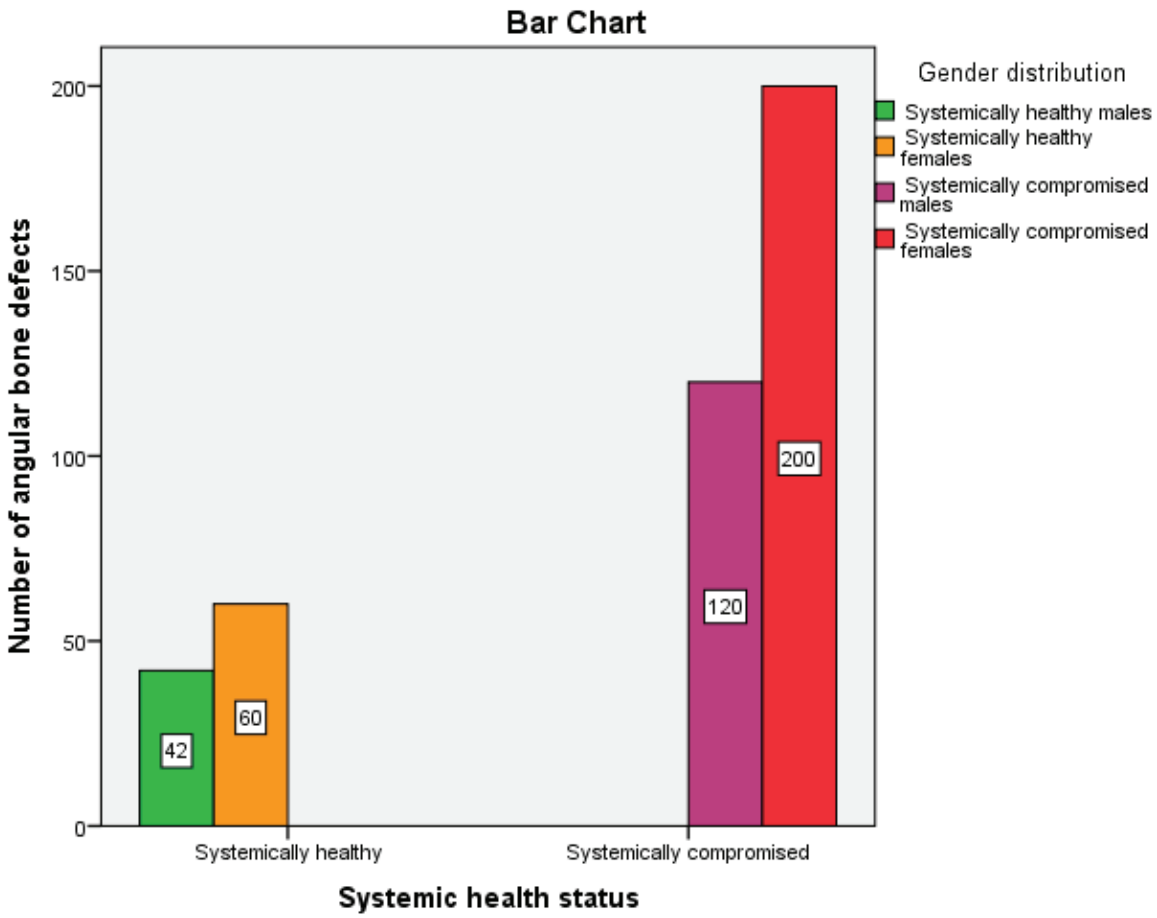

Figure 4: The bar graph showing association between systemic health status of the patients and the number of angular bone defects. The X axis represents the systemic health status of the patients and the Y axis represents the number of angular bone defects. The systemically healthy male patients presented with 42 angular bone defects (green colour). The systemically healthy female patients presented with 60 angular bone defects (orange colour). The systemically compromised male patients presented with 120 angular bone defects (purple colour) and the systemically compromised female patients presented with 200 angular bone defects (red colour).The systemically compromised patients presented more angular defects than the systemically healthy patients.There was a significant association between systemic health status of the patients and the number of angular bone defects. Chi square test was done; p=0.01; statistically significant (p<0.05) .

Conclusion

Within the limitations of the study, it was concluded that there was higher prevalence of angular bone defects in chronic periodontitis patients with systemic diseases (320 sites) as compared to the ones without systemic diseases (102 sites).

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Ethical Clearance: It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

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