# Assessment of Alveolar Ridge Defects based on Sibert's Classification - A Retrospective Study

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## Abstract

Alveolar ridge defect may occur due to injury,trauma,normal healing after extraction, denture wear and periodontitis. Based on sibert's classification, it can be classified into three classes: class I (buccolingual loss of tissue), class II (apico coronal loss of tissue) and class III (both loss of tissue). It is important to close the ridge defect by replacing the tooth loss and to achieve good esthetic, phonetic and mastication. The aim of this study was to assess the prevalence of alveolar ridge defects using seibert's classification among partially edentulous patients.This study was conducted in a university setting among the outpatient population of a dental college.We reviewed patients records and analysed the data of 86000 patients between June 2019 and March 2020. 32,837 patients data were included from 86000 patients and were assessed and the data was tabulated in excel and later was imported to SPSS software by IBM and descriptive statistics were done and results were analysed graphically. The statistical analysis were performed using chi-square test.Based on the results, 50.5% males,51.4% females and 40% transgender have class I alveolar ridge defects; 0.7% male,0.8% females and 0% transgender have class II alveolar ridge defects;1.3 % males,1.4% females and 0% transgenders have class III alveolar ridge defects; 47.5% males, 46.4% females and 60% transgender have normal edentulous ridge.To conclude, the Sibert's classification helps in suggesting a proper treatment plan for the patient to ensure that the treatment outcomes turn out to be successful.

***Keywords***- *edentulous, sibert's classification,alveolar ridge,esthetics*

## Introduction

Prosthodontists may face challenges in treating patients with alveolar ridge defect in partially edentulous patients [1].Local alveolar ridge defect can be seen as a deficient volume of limited extent of soft tissue and bone within the alveolar process. The edentulous space may be due to loss of tooth, due to trauma during extraction or congenital defects which eventually leads to alveolar bone loss. This loss in the alveolar bone causes the intrusion of the overlying soft tissue during healing which ultimately creates contours [2] .These contours possess difficulty in fabrication of prosthesis from an aesthetics point of view. [3] It also leads to food impaction and difficulty in speech due to percolation of saliva.[4] As a prosthodontist, it is required to replace the missing tooth and close the ridge defect for patients, for achieving aesthetics, kinetics, phonetics and mastication [5]. A variety of ridge deficiency classification have been described pertaining to both hard and soft tissue defects.

Siberts (1983) presented a classification of ridge defects to assess deficiencies in form, function and aesthetics(6). This classification takes into account both hard and soft tissues [7,8]. Siberts class I defects describe

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ridges deficient in the horizontal dimension. Siberts class II defects describe ridges deficient in the vertical dimension [9]. Sibert's class III defects include ridges deficient in both the horizontal and vertical dimensions [10]. Few studies have been done on the prevalence of alveolar ridge defect using seibert's classification.

Treatment of alveolar ridge defects includes ridge augmentation proposed by Langer, Kaldhal et al., and Calanga.[11]It can be classified into soft tissue augmentation and hard tissue augmentation procedure[6]. Soft tissue augmentation procedure is the roll technique for Class I alveolar ridge defects, interproximal graft technique and free gingival graft for Class II alveolar ridge defects and class III alveolar ridge defects.[6,12] Ridge augmentation is mostly done for Class I alveolar ridge defects.For ClassII and ClassIII alveolar ridge defect, bone augmentation technique by either autogenous grafts, allografts, or xenografts is done[13]. Other treatment modalities include removable partial denture, fixed partial dentures and Andrew's bridge. [13] Few studies have been done on the prevalence of alveolar ridge defect using Siebert's classification on fixed partial denture patients. Many studies have presented case reports on various treatment options for alveolar ridge defects.Therefore, the purpose of the study is to assess the prevalence of Siberts classification among partially edentulous patients to achieve good treatment outcomes for the different ridge defects.[10,14,15]

## Materials and Methods

### Sample Collection:

This study is in a university setting, it is a cross sectional retrospective study. the different advantages for taking up a study in university setting easy retrieval of records, the available data is from the same ethnicity. The disadvantages being the study is located in one geographical location, Limited population and same ethnicity. We reviewed patients records and analysed the data of 86000 patients between June 2019 and March 2020.32,837 patients data were included out of 86000 patients the study was approved by the university ethical committee. Patients who were completely edentulous were excluded from this study. Meanwhile, single partially edentulous site, multiple partially edentulous site, excessive ridge defect, and anterior or posterior ridge defect were included in this study. The alveolar of the patient is classified based on the siberts classification.

### Sample Size:

Total of 32,832 patients is included in this study

## Statistical Analysis

The data collected was tabulated in excel and was then imported to SPSS software by IBM. then, descriptive statistics was computed. Chi-square test was done. The chi-square test was used to compare the data and check for the distribution at 0.05 level of significance for effect of statistical significance. Results were analysed graphically, for both frequency distribution and statistical significance.

## Results And Discussion

In this study, 43.97% males and 34.78% females have class I defects. 0.49% male and 0.49% females have class II defects. 1.3 % males,1.4% females and 0% transgenders have class III defect; 0.90% males and 0.74% females have normal edentulous ridge.( Figure 3)

Normal ridge is seen more in younger age and class I ridge more after 40 years whereas, in transgender below 35 years, more number of class I defect is seen and above 35 years, more number of normal ridge is prevalent.(Figure 2)Males in the age group of 1 to 15 years mostly have normal edentulous ridge, 15 to 30 years both class I defect as well as normal ridge is equally prevalent. After 30 years class I defect is more prevalent than other defects. Females of all age groups have equal prevalence of normal, class I ridge[16]. This study shows the prevalence of alveolar ridge defect according to Seibert's Classification. Siebert, classified the alveolar ridge defect according to the presence of deficiencies in form, function, and esthetics. [17,18]In these studies, normal ridge had the most number of incidence, followed by Class I and Class II with least prevalence was class III. According to these studies also, male gender has high prevalence in having alveolar ridge deformities with 54.5% and also patients in the age within 40–49 years old have a high incidence of alveolar ridge defect with 50.9%. However, no study has been done on the correlation of alveolar ridge defect with age and gender. Modification of Siebert's classification was introduced by Allen et al. [19] in the year 1985 which included the magnitude of the ridge: This classification was meant to

aid in the treatment planning and prognosis of the patient with alveolar ridge defect. The main problem of alveolar ridge defect is anterior tooth loss ,which is difficult to treat due to esthetic factors [12,19].

Besides, other problems might also be encountered such as lack of emergence profile, lack of root eminence, lack of marginal gingiva, and presence of black triangles in interdental papillae area which is a hindrance esthetically [20]. Black triangles can be described as dark appearance of alveolar tissue above the pontic [21].The main reason for alveolar ridge deformities is due to trauma to the alveolar process during extraction. After extraction, the process of healing of the bone and soft tissue took place. However, due to the trauma, the soft tissue will collapse into the bone defects which create contours which make esthetic functional prosthesis would be difficult [22]. Therefore, the management of alveolar ridge defect can be classified into hard tissue augmentation and soft tissue augmentation. [6] There are various treatment options to treat alveolar ridge defect such as the roll technique for Class I defect and interproximal graft technique for Class II and Class III defect, free gingival graft, bone grafting using both inlay and onlay grafting technique either autogenous grafts, allografts, or xenografts, ridge augmentation using bone graft followed by implant placement, removal partial denture, fixed partial denture and Andrew's bridge. [12]

To achieve an esthetically successful pontic, all criteria including replication of the form, contours, incisal edge, gingival embrasures, and color of adjacent teeth should be met. [21] Besides, the study of prevalence in Siebert's classification was intended to give a clear image on the treatment choices and alternatives to achieve successful outcomes. In a study done by Abrams et al.,[23] they reported that the prevalence of anterior ridge deformities of partially edentulous patients was 91% similar to the current study which is 91.6%. Class III defects were the highest with 55.8% followed by Class I defects with 32.8% and Class II defects with 2.9%. In a study done by John et al.,[24] bone defects in the posterior mandibular tooth region show a maximum defect with 33.8% followed by maxillary posterior with 19.9%. Since the prevalence of Class III defect is the highest compared to Class I and Class II, many articles have described the treatment outcome for Class III defects patients in their case report article.[25,26,12]In Class III defect, Andrew's bridge is the best option due to the challenging situation with esthetics and severe alveolar ridge defect. Andrew's bridge was introduced by Dr. James Andrew of Amite Louisiana in the year 1975.[27] It is a combination of a fixed dental prosthesis and a removable dental prosthesis and commonly used for anterior edentulous area. It replaced the teeth within the bar area which were incorporated with the fixed dental prosthesis. The removable dental prosthesis received retention from the vertical wall of the bar.

The advantages of Andrew's bridge system are the advantages of fixed and removable partial dentures with better esthetics, hygiene along with better adaptability, and phonetics [12]. Besides, it is economical and comfortable for the patient. Other advantages of this technique process are the flexibility and stabilizing quantities of the prosthesis. In a study done by Snehal and Amberkar[12,18]the clinical case report suggests that soft tissue augmentation with subepithelial connective tissue graft is a promising treatment in a condition with Class I defect.

The study was done by harvesting the connective tissue graft from the palate along with metal ceramic restoration. The advantages of this technique are maintenance of adequate blood supply, and the use of stents or hemostatic agent can be avoided and healing by first intention which provides greatest comfort to the patient [18] postoperatively.[18] Apart from that, the disadvantages of this technique are the limited volume of graft which depends on the size of the graft and increases prone to necrosis in case of large grafts.[28] In a study done by Tanaka et al.,[29]a segmental osteotomy procedure with an interpositional graft is done on a patient with Class II alveolar ridge defect. Most of the studies showed that this technique is practical and a predictable procedure with low incidence of complications and a high probability of successful treatment outcomes.[30]

Lack of alveolar bone height (apico coronal) condition can be overcome using various vertical guide bone regeneration procedures, alveolar distraction osteogenesis, titanium mesh, or only bone graft. According to this, other literatures Nor Syakirah Binti Shahroom, et. al.[31] In this study class III ridge defects had the most number of incidence-40 % class I- 33.3%, classII-18.3 %, males have high prevalence of 54.5 %

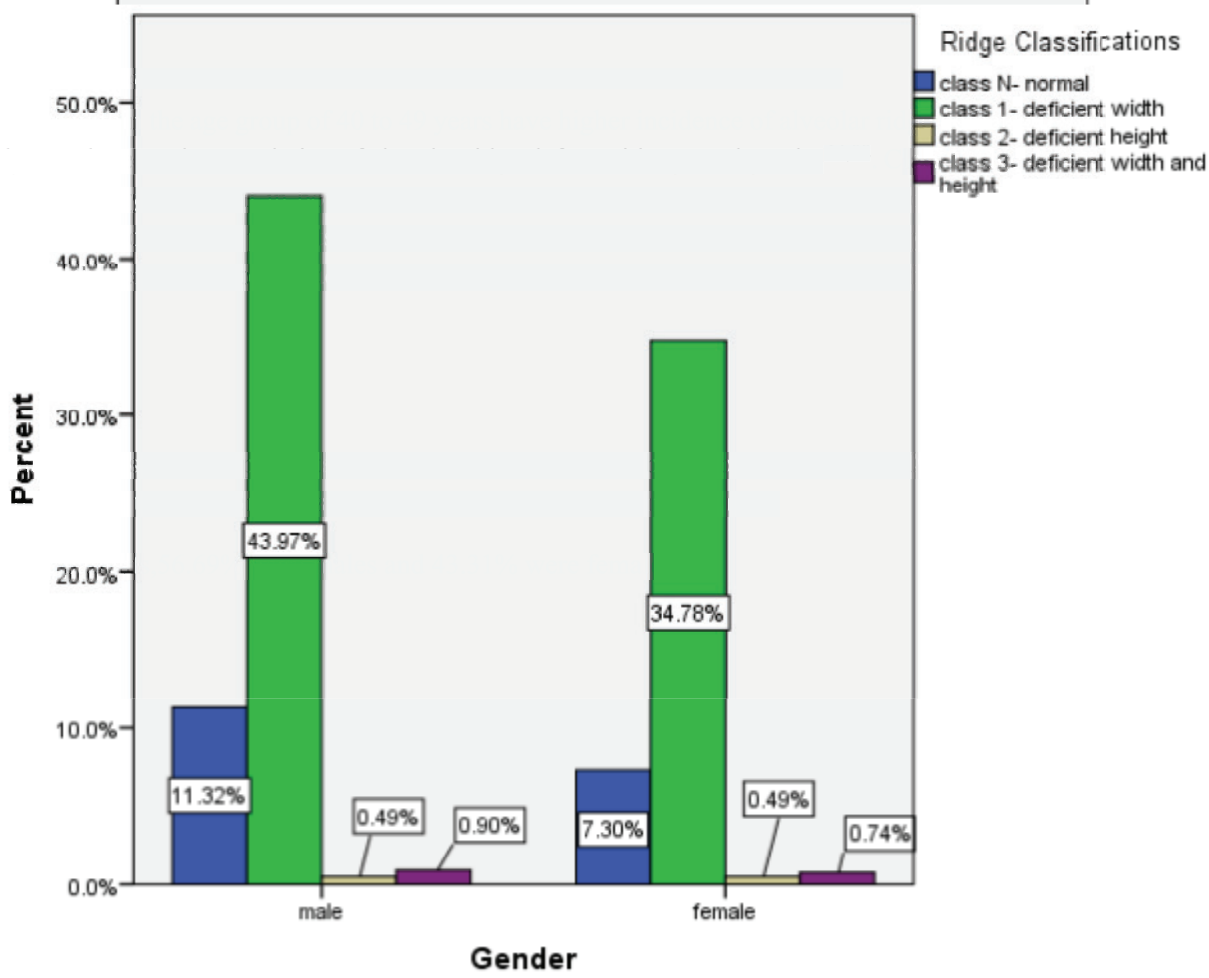


Figure 3: Bar graph represents the association between gender and alveolar ridge class according to seibert's classification.X-axis represents the gender and Y-axis represents the ridge classification where blue colour denotes normal ridge,green colour denotes class I ridge, yellow colour denotes class II ridge and violet colour denotes class III ridge.Chi-square test was done and association was found to be statistically insignificant [Pearson's Chi Square value:5.910, DF:6, p value:0.433(>0.05)]. Even Though it is statistically insignificant, majority of the male participants (43.97%) had Class I ridge pattern (deficient width) than female participants.

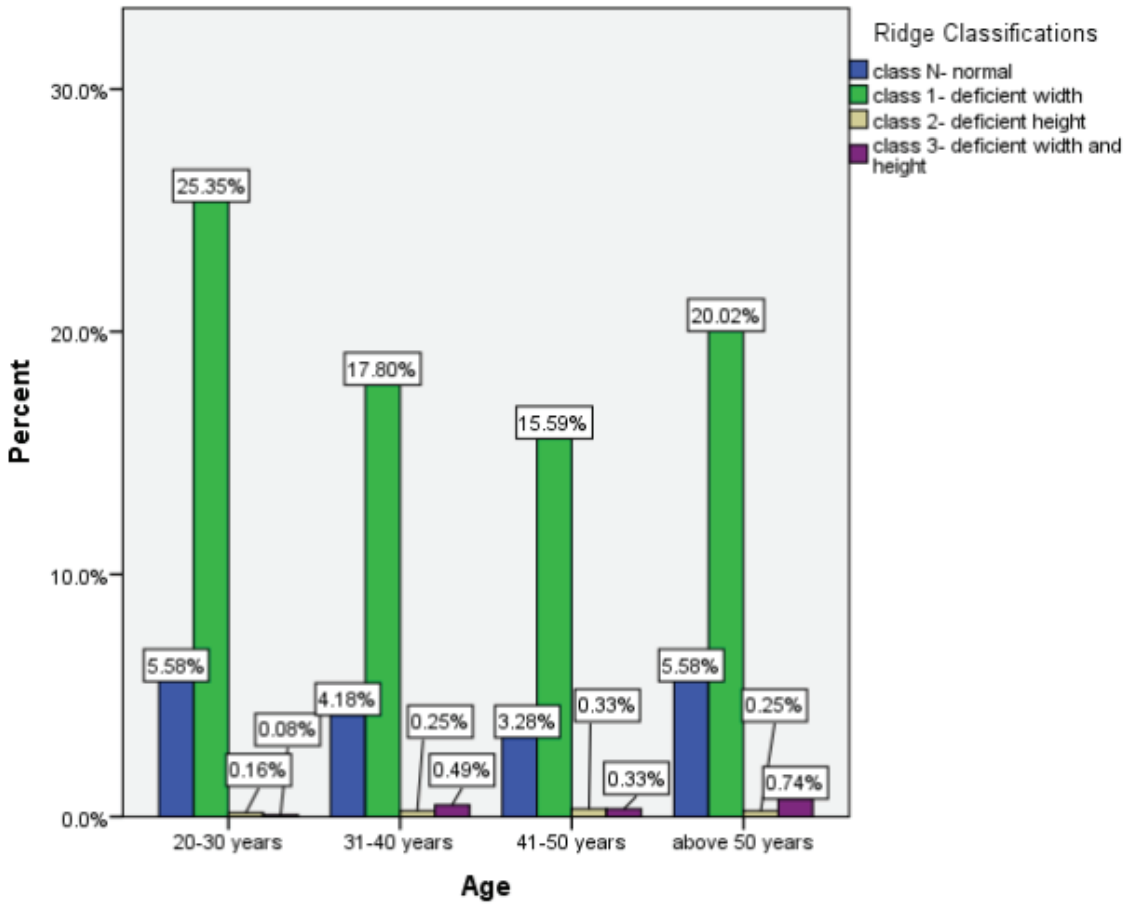


**Figure 4: Bar graph represents the association between age groups of the patients and alveolar ridge defect according to seibert's classification.X-axis represents the age groups of the patients and Y-axis represents the ridge classification where blue colour denotes normal ridge,green colour denotes class I ridge, yellow colour denotes class II ridge and violet colour denotes class III ridge. Chi-square test was done and association was found to be statistically significant. [Pearson's Chi Square value:426.482, DF:9,p value:0.00(<0.05)]. Majority of the participants distributed in the age group between 20-30 years (25.35%) had Class I ridge pattern (deficient width) than the other age groups.**

## Conclusion

jIt is important to assess the alveolar ridge deficiencies among patients with edentulism. According to the amount of destruction, it can be classified based on siberts classification. through this various treatment modalities can be suggested to the patient to ensure that the prognosis and treatment outcome turn out to be successful. Within the limit of this study, it is seen that class I ridge defect and normal ridge is most prevalent in all the three genders with slight deviation with age.

**Acknowledgement:** We thank DR. Revathi Durisamy, for her guidance, and DR. Ravindra Kumar Jain ,for comments that greatly improved the manuscript. We would also like to show our gratitude to the Director of Academics, DR. Deepak Nallasamy Veeraiyan, Saveetha Institute of Medical and Technical Sciences, for sharing his pearls of wisdom with us during the course of this research, and we thank the reviewers for their so-called insights. We are also immensely grateful to Department of Prosthodontics,Saveetha Dental College for their comments on an earlier version of the manuscript, although any errors are our own and should not tarnish the reputations of these esteemed persons.

**Conflict of Interest:** There is no conflict of interest.

**Source of Funding:** Self.

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

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