ASSESSMENT OF ALVEOLAR BONE THICKNESS AND BONE DENSITIES AROUND MAXILLARY CENTRAL INCISORS OF DIFFERENT INCLINATION: A CONE-BEAM TOMOGRAPHY STUDY.

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INDEX

LIST OF TABLES

LIST OF GRAPHS

LIST OF ABBREVIATIONS

Sr. No	ABBREVIATIONS	FULL FORM
1.	CBCT	Cone beam computed tomography
2.	CT	Computed tomography
3.	2D	2 Dimensional
4.	3D	3dimensional
5.	mm	Mili meter
6.	cm	centimeter
7.	kV	Kilo volts
8.	mA	Mili amperes
9.	P value	Probability value
10.	DEXA	Dual energy X-ray absorptiometry
11.	ANOVA	Analysis of variance
12.	GS	Gray Scale
13.	HU	Hounsfield unit
14.	OPG	Orthopantomograph
15.	IOPA	Intraoral Periapical
16.	SN	Sella–nasion
17.	LCD	Liquid crystal display
18.	FOV	Field of view
19.	CPU	Central processing unit
20.	GHz	Gigahertz.
21.	Gy	Gray
22.	CS	Care Stream

LIST OF COLOUR PLATES

INTRODUCTION

Alveolar bone is a specialized part of maxillary and mandibular bones that forms the primary supporting structure for teeth. It is surrounded by the supporting bone with which it forms an anatomical unit. The supporting bone includes the buccal and lingual cortical plates and the septa. Cancellous bone is interposed between the alveolar wall and the cortical plates.[1]

The alveolar bone in the anterior region is comparatively thinner than in other parts of jaw, therefore a very limited scope is available to carry out major orthodontic tooth movements.[2,3] The alveolar process can be further divided into external cortical plate which forms the outside of jaw bone and the inner socket wall which is formed by compact bone and is seen as a thin radio-opaque border or lamina dura around the teeth. In between the external and internal cortical plates cancellous bone is present which has a relatively lesser bone density in comparison to the compact bone.[1]

Maxillary anterior region is the most esthetic region of our face and good facial esthetics depend upon proper inclination of maxillary central incisors. Corrective orthodontic procedures are mostly directed in correcting the inclination of central incisors by applying tipping or torqueing forces.[4,5]

Cortical plates in the anterior region of jaw are considered as the orthodontic walls during orthodontic tooth movement and an efficient orthodontic tooth movement can only be achieved when there is adequate amount of alveolar bone available for support.[2,6] The thickness of the alveolar bone around the teeth is one of the major factors that determines the amount of movements that can be carried out within physiological limits.[7] Orthodontic tooth movement follow a basic axiom that the " bone traces the tooth movement" which means that whenever a tooth movement occurs there is simultaneous remodeling of the alveolar bone surrounding the tooth.[6]

Excessive tooth movements in a limited space can ultimately cause the tooth to come in contact with the cortical plate leading to the resorption of cortical plate and root exposure. Resorption of alveolar bone can cause the roots to become devoid of overlying bone leading to development of periodontal defects such as fenestrations and dehiscence, root resorption and gingival recession.[6] Furthermore the remodeling capacity of the alveolar bone to compensate for bone loss is hampered or reduced owing to the thin layer of alveolar bone surrounding the anterior region of jaw. It has been a well-established fact that the thin alvelolar bone in the anterior region of jaw houses periodontal defects of fenestrations and dehiscence which if not taken into consideration can severely affect the outcome or prognosis of any orthodontic treatment procedure and is a potential risk factor for causing an iatrogenic damage instead of benefit to the patient. Therefore before planning any orthodontic procedure the knowledge of alveolar bone thickness surrounding the teeth and awareness of the pre-treatment alveolar bone defects such as fenestrations and dehiscences is necessary.[8,9]

Various methods have been employed for the assessment of alveolar bone thickness which include direct measurements on cadaveric sections and radiographic methods using modalities such as lateral cephalograms, OPG, CT and CBCT.

Cone-beam tomography (CBCT) is a recent and advanced radiographic imaging technique that overcomes the limitations of conventional radiography by producing 3D images that allows high-definition true-to-scale analysis of specific regions without distortion or superimposition of structures.[2] Studies have also shown that apart from making linear measurements CBCT can also be used for evaluation of bone density.[10]

Bone density is an important parameter for carrying out orthodontic tooth movements. Preoperative evaluation of bone density is therefore essential as the rate of tooth movement is inversely proportional to the bone density.[11] Studies have shown that the bone density varies according to region from tooth to tooth and also in accordance with the inclinations of central incisors.[2] Considering these facts this study was planned to evaluate alveolar bone thickness and density around permanent maxillary central incisors of different inclination assessed with cone-beam tomography.

AIMS AND OBJECTIVES

To evaluate alveolar bone thickness and density around maxillary central incisors of different inclinations using cone-beam tomography.

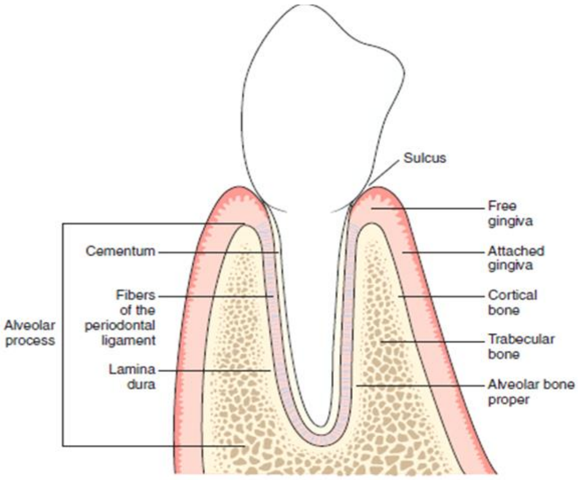
OBJECTIVES

- To evaluate the thickness of alveolar bone in differently inclined maxillary central incisors.
- To evaluate the density of alveolar bone around differently inclined maxillary central incisors.
- To evaluate the prevalence of bony defects such as fenestration and dehiscence in differently inclined maxillary central incisors.

REVIEW OF LITERATURE

Bone of the alveolar process is composed of both an outer layer of cortical bone and an inner region of cancellous bone. The cortical bone is composed of lamellar bone containing Haversian systems for bone maintenance and remodeling. The alveolar process contains the nerves and blood vessels that support the bone and teeth also bone marrow is present which contains significant amounts of adipose cells, osteogenic cells and hemopoietic tissue.[1] Cortical bone of the alveolar process is thinner in the maxilla than in the mandible. It is thickest in the mandible adjacent to the premolars and molars.[1,12,13]

The alveolar bone proper merges with the cortical bone of the process to form the alveolar crest at the coronal border of the socket. In a healthy individual, the alveolar crest is generally 1–2 mm below the cement-enamel junction (CEJ) of the tooth. It becomes a thin margin of bone adjacent to the tooth. The bone between adjacent sockets is termed the interdental septum it is composed of cortical bone. At the apex of the tooth cancellous bone is present which occupies the region between cortical plates. The amount of thickness of cancellous bone varies according to the location within the arch. The anterior region of the arch containing the incisors contains very little cancellous bone as the cortical plates lie in close proximity and merge with the alveolar bone proper. In the posterior arch, which contains multiple rooted teeth a significant amount of cancellous bone present.[1,14]



The basic mechanism for inducing any orthodontic tooth movement is to apply sufficient amount mechanical stimuli in the form of force which in turn causes remodeling of the periodontal ligament and alveolar bone as a result of which the tooth moves within bone. But movements of the tooth are limited and the width of alveolar bone surrounding the tooth is the limiting factor for this movement. Inadequate bone thickness or absence of bone around such teeth is a complicating factor for the prognosis of such treatments causing an iatrogenic damage if not benefit such as external root resorption, gingival recession, dehiscence, and fenestration.[15] The lack of facial or lingual cortical plates causing the exposure of cervical root surface and along the marginal bone, represents an alveolar defect called dehiscence and similar such defect with marginal bone intact is termed fenestration. The occurrence of dehiscence and fenestration during orthodontic treatment depends on several factors which include direction of movement, the frequency and magnitude of orthodontic forces, and the volume and anatomic integrity of periodontal tissues. Many studies have reported a very thin layer of alveolar bone surrounds the upper and lower anterior teeth. The thickness of this alveolar bone is further not uniform but varies and is dependent on a number of factors including growth pattern (vertical or horizontal), inclination of the tooth within surrounding bone and population of a particular region and also varies on the basis of gender.[7,15]

Larato DC (1970)[16] studied 108 human skulls with an age range (20- 70 years) to evaluate the distribution of alveolar bone fenestration and dehiscence. He examined a total of 3416 teeth and concluded that fenestration are present mostly present in the maxillary and mandibular anterior region as compared to posterior region. Most commonly affected teeth are maxillary 1st molar and maxillary and mandibular cuspids. He also found that fenestration and dehiscence are also present in young adults and no relationship was established for its occurrence and age of patient.

Abdelmalek RG, Bissada NF (1973)[17] carried out a study to re-evaluate the incidence and distribution of fenestrations and dehiscences in dry human Egyptian skulls and to correlate the findings with previous reports. This study was carried out on 154 adult jaws, each jaw was carefully examined for the presence of fenestration and dehiscence in the alveolar plate. Results showed a marked variation in the incidence of alveolar bony defects when compared with previous investigations.

48.5% of the maxillary and mandibular jaws examined showed one or more bony defects. Incidence of defects was found to be more in the maxillae than the mandibles. Fenestrations were found more common than dehiscences in the maxillary arch than in mandibular arch. Bony defects were absent over the lingual side of both maxilla and mandible.

Wehrbein H, Bauer W, and Diedrich P (1996)[18] conducted a study to investigate the morphologic and radiographic changes in lower central incisor after orthodontic treatment. They studied the mandible of deceased 19 year old women who had undergone orthodontic treatment with an edge-wise appliance. They assessed the alveolar bone height and root resorption around the mandibular incisors. SEM analysis suggested that all the incisors were severely resorbed and a greater resorption was noted on the mesial and the distal aspects of the tooth. This study highlighted the importance of pre- therapeutic evaluation of bone as well as root structure to avoid the possibility of any iatrogenic effect due to the therapy.

Lupi JE, Handelman CS and Sadowsky C (1996)[19] studied the prevalence and severity of apical root resorption and alveolar bone loss in 88 orthodontically treated adults. Pre and post treatment bitewing radiographs were studied for posterior teeth while periapical radiographs were used to study the anterior teeth. The study confirmed the occurrence of iatrogenic damages due to orthodontic treatment in the form of root resorption, loss of alveolar bone height etc. It is therefore necessary to analyze the risks and benefits involved for all patients, considering age, malocclusion, periodontal health, and probable iatrogenic response before the orthodontic treatment.

Sarikaya S, Haydar B, Ciger S, Ariyurek M (2002)[6] studied alveolar bone changes due to retraction of the incisors in patients with bimaxillary protrusion. A total of 19 CT scans were studied. Measurements were made in the beginning and after 3 months of the treatment. The angular and linear measurements of the central incisors were evaluated on lateral cephalograms. Results showed that changes were significant at coronal level, alveolar bone width decreased significantly at the mid-root level for the maxillary right lateral, right central, left central, and left lateral incisors and the change in maxillary labial bone thickness was not statistically significant. The results concluded that when maxillary and mandibular incisors are retracted, the risk of adverse effects exists. These changes can only be identified by CT scan and not by clinical, macroscopic or cephalometric analysis.

Misch KA, Yi ES, Sarment DP (2006)[20] conducted this study to compare the CBCT measurements of periodontal defects with the traditional methods. Artificial osseous defects were created on mandibles of dry skulls. CBCT scan measurements, periapical radiography (PA) measurements and direct measurements using a periodontal probe were compared to an electronic calliper that was used as a standard reference. The results of this study showed that all bony defects were identifiable and measurable directly with CBCT and compared to radiographs, the three-dimensional capability of CBCT offers a significant advantage because all defects can be detected and quantified. CBCT measurements compared well to traditional methods, with the advantage of allowing observance of periodontal defects in all directions.

Pudyani PS, Sutantyo D, and Suparwitri S (2008)[21] evaluated various morphological changes of alveolar bone due to orthodontic movement of maxillary and mandibular incisors. The result of their study has suggested that the remodeling process can compensate for the limitation of tooth movements, but if extensive palatal tooth movements are carried out it may cause the tooth root to contact with the palatal cortex. If the movements are still carried out even after the contact it will result in perforation of cortical plate followed by bone loss, root resorption and relapse. To avoid such problems it is necessary to first evaluate the bone structure around the anterior tooth so that teeth can reach a stable position after treatment and the adverse effects over the tooth supporting structures are minimized. It is also necessary that the incisor should be placed in the medullary region of the alveolar bone and a good balance is maintained with the labial and lingual muscles these factors will help to achieve a good stability in incisor movement.

Park HS, Lee YJ, Jeong SH, and Kwon TG (2008)[22] conducted this study to quantitatively evaluate density of the alveolar and basal bones of the maxilla and the mandible. Sixty-three sets of computed tomographic (CT) images were selected, and bone density was measured with V-Works imaging software (Cybermed, Seoul, Korea). The sample consisted of 23 men (ages, 29 ± 10.9 years) and 40 women (ages, 25.6 ± 7.6 years).

Cortical and cancellous bone densities at the alveolar and basal bones at the incisor, canine, premolar, molar, and maxillary tuberosity/retromolar areas were measured. Results of the study showed that cortical bone density of the maxilla ranged approximately between 810 and 940 Hounsfield units (HU) at the alveolar bone. At maxillary tuberosity (443 HU at the buccal and 615 HU at the palatal alveolar bone), and between 835 and 1113 HU at the basal cortical bone except for tuberosity (542 HU). The cortical bone density of the mandible ranged between 800 and 1580 HU at the alveolar bone and 1320 and 1560 HU at the basal bone. The highest bone density in the maxilla was observed in the canine and premolar areas, and maxillary tuberosity showed the lowest bone density. Density of the cortical bone was greater in the mandible than in the maxilla and showed a progressive increase from the incisor to the retromolar area.

Gracco A, Lombardo L, Mancuso G, Gravina V, Siciliani G (2009)[23] carried out a study to test the null hypothesis that there are no correlations between the morphology of the upper jaw, the position of the upper incisors, and facial type. Cone-beam computed tomography (CBCT) scans of these patients showing sagittal sections of upper central incisors were studied. Other parameters such as the alveolar thickness, the alveolar height, and the dental movement were also measured for defining the dento-skeletal relationship.

Results suggested that the short face type patients had a greater alveolar bone thickness than long face type patients. In short face type and normal face type subjects the root apex of the upper incisors was farther away from the lingual cortex than in the long face type patients. Also this study showed no difference between the three facial types irrespective of the inclination of the teeth or the measurements of alveolar height.

Nimigean VR, Nimigean V, Bencze MA, Dimcevici-Poesina N, Cergan R, Moraru S (2009)[3] determined the prevalence and distribution of fenestrations and dehiscences of the jaw bones among the Caucasian population using 138 skull specimens. Age ranged from 21 to 54 years. 89.855% of the investigated skulls showed alveolar defects, fenestrations in 69.565% and dehiscences were seen amongst 53.623% of the skulls. Two or more defects were present in 98.387% of the affected specimens. 74.679% fenestrations were seen in the maxilla while dehiscence were most commonly seen in the mandible with 71.613%. Fenestrations were mostly present in the posterior region of maxilla 49.268% while dehiscence were present in the anterior region of mandible 15.631%. Tooth most commonly affected were maxillary first molar (42.628 %), followed by the mandibular first molar (16.026%) and maxillary first premolar (14.423%). Dehiscence affected teeth were mandibular canine (40.645%), the mandibular first premolar (18.064%) and maxillary canine (17.419%) respectively. 48.563% fenestrations were present in the apical third of roots in maxilla, (28.161%) in the middle third of the roots. In the mandible (18.966%) in the coronal third of the dental root. The results of this study concluded that it is essential to evaluate the potential of developing fenestrations and dehiscences through oral surgery procedures this will help the clinicians to accordingly design and manage treatment.

Lund H, Gröndahl K, Gröndahl HG (2010)[24] conducted a study to evaluate the accuracy and precision of cone beam computed tomography (CBCT) for the measurements of root length and marginal bone level in vitro and in vivo during the course of orthodontic treatment. This study was carried by taking CBCT of thirteen patients (aged 12–18 years) and a dry skull. For in vivo evaluation of changes in root length, an index according to Malmgren et al was used. Despite of changes in tooth positions of teeth, the CBCT technique yielded a high level of reproducibility showing its accuracy and preciseness in the assessment of root length and bone level changes during orthodontic treatment.

Lee SL, Kim HJ, Son MK, Chung CH (2010)[25] conducted a study to evaluate the thickness of buccal and palatal alveolar bone and buccal bony curvature below root apex in maxillary anterior teeth of 20 Korean adults using Cone-beam CT images. The results showed mean thickness of buccal plate 3 mm below CEJ was 0.68 ± 0.29 mm at central incisor, 0.76 ± 0.59 mm at lateral incisor, and 1.07 ± 0.80 mm at canine. Mean thickness of palatal plate 3 mm below CEJ was 1.53 ± 0.55 mm of central incisor, 1.18 ± 0.66 mm of lateral incisor, 1.42 ± 0.77 mm of canine. Bucco-lingual diameter 3 mm below CEJ was 5.13 ± 0.37 mm of central incisor, 4.58 ± 0.46 mm of lateral incisor, and 5.93 ± 0.47 mm of canine. Distance between root apex and the deepest point of buccal bony curvature of central incisor was 3.67 ± 1.28 mm at central incisor, 3.90 ± 1.51 mm at lateral incisor, and 5.13 ± 1.70 mm at canine. This study showed that in Korean adults, the thickness of maxillary anterior buccal plate was very thin less than 1mm and the thickness of palatal plate was thicker.

Timock AM, Cook V, McDonald T, Leo MC, Crowe J, Benninger BL, and Covell DA (2011)[26] conducted a study for the evaluation of the accuracy and reliability of buccal bone height and thickness measurements from cone-beam computed tomography imaging. Twelve embalmed cadaver heads (5 female, 7 male; mean age: 77 years) were scanned with an i-CAT 17-19 unit (Imaging Sciences International, Hatfield, Pa) at 0.3 mm voxel size. Buccal alveolar bone height and thickness measurements of 65 teeth were made in standardized radiographic slices and compared with direct measurements made by dissection. All measurements were repeated 3 times by 2 independent raters and examined for intrarater and interrater reliability.

Results of this study showed a high intrarater reliability for all measurements except for buccal bone thickness. CBCT measurements did not differ significantly from direct measurements, and there was no pattern of underestimation or overestimation. This study suggested that the CBCT can be used to quantitatively assess buccal bone height and buccal bone thickness with high precision and accuracy.

Janua´rio LA, Duarte WR, Barriviera M, Mesti JC, Arau´jo MG, Lindhe J (2011)[27] conducted a study to determine the thickness of the facial bone wall in the anterior dentition of the maxilla at different locations apical to the cemento-enamel junction (CEJ). Cone-beam computed tomography scans of 250 subjects, aged between 17 and 66 years were studied and measurements of the (i) distance between the CEJ and the facial bone crest and (ii) the thickness of the facial bone wall were performed. The bone wall dimensions were assessed at three different positions in relation to the facial bone crest at distances of 1, 3, and 5 mm apical to the crest. The mean overall wall thickness varied within a narrow range (0.5-0.4 and 0.7-0.4mm) and was similar at different locations along the wall (1, 3, and 5mm apical to the bone crest). The results showed that the thickness of the facial bone did not vary with age or the location of measurements also no difference between the values obtained from measurements made in the right and left jaw quadrants. 85% of the sites presented a wall thickness of < 1 mm while 40% and 60% of sites had a wall thickness of < 0.5mm.

Han JY, Jung GU (2011)[28] Carried out a study to evaluate the buccal and lingual bone thickness in the anterior teeth and the relationship between bone thickness and the tissue biotype.

Three male and two female human cadaver heads (mean age, 55.4 years) were used in this study. According to the thickness of periodontium patients were categorized into a thick or a thin group. Overlying mucosa was reflected to expose the underlying bone and measurements in the anterior regions were performed. A probe and stopper was used to measure the thickness of bone plate at the alveolar crest (AC), 3 mm apical to the alveolar crest (AC-3), 6 mm apical to the alveolar crest (AC-6), and 9 mm apical to the alveolar crest (AC-9). The results showed that all four of the cadaver heads had a thick biotype. There was no penetration or dehiscence. The thickness of the buccal plates at the alveolar crest were 0.97±0.18 mm, 0.78±0.21 mm, and 0.95±0.35 mm in the maxillary central incisors, lateral incisors, and canines, respectively. The thickness of the labial plates at the alveolar crest were 0.86±0.59 mm, 0.88±0.70 mm, and 1.17±0.70 mm in the mandibular central incisors, lateral incisors and canines, respectively. This study concluded that the thickness of the labial plate in the maxillary anteriors was very thin and a great caution was needed for placing an implant. The labial plate thickness of the maxillary central incisor, the mandibular central incisor, and the mandibular lateral incisor was thinnest at the alveolar crest. In the present study, the thickness of the buccal plate was a little thicker than that of the palatal plate in the maxillary anterior teeth. The thickness of the buccal plate at the alveolar crest was 0.97±0.18 mm, 0.78±0.21mm, and 0.95±0.35 mm in the maxillary central incisors, lateral incisors, and canines, respectively. The thickness of the palatal plate at the alveolar crest was 0.82±0.26 mm, 0.98±0.45 mm, and 0.72±0.45 mm in the maxillary central incisors, lateral incisors, and canines, respectively. There was no fenestration in this study, and it was assumed that the observations were due to their thick gingival biotype.

Bajracharya M (2011)[12] analyzed the maxillary bone thickness at incisor area in class II division I malocclusion. 121 patients were included in this study between the age group of 12-14 years. On the basis of SN-MP angle patients were divided into three groups and alveolar bone thickness was measured. SN-MP angle < 29^{o} were included in low angle group, 29^{o}- 40^{o} in average and the > 40 in high angle groups. Results of this study revealed that alveolar bone thickness was less in the apical area of maxillary incisor amongst the high angle group compared to low angle group subjects. The apical bone ratio of maxillary and mandibular incisor was found to be greatest in high angle male subjects as compared to the average and low value subjects while for females no significant statical difference was noted. Mandibular alveolar bone thickness at the apex distance from the lower labial cortex to the lingual cortex was found to be thickest amongst the low angle male and female subjects. The ratio between the distance of lower labial alveolar bone edge to the lower lingual palatal alveolar bone edge was found to be highest in high angle males and females compared to average and low subjects. The result also showed that upper incisor root apex was more close to palatal cortex of maxillary bone and to the symphysis of the mandibular bone in high angle than in low and average angle male and female subjects.

Hsu JT, Chang HW, Huang HL, Yu JH, Li YF, Tu MG. (2011)[11] conducted a study on eight patients to evaluate bone density around six teeth (both maxillary central incisors, lateral incisors and canines) both before and after 7 months of orthodontic treatment. The results showed that the mean bone density reduction was greatest for both central incisor i.e. by 29.0% and 25.8% in the upper-right and upper-left central incisors, respectively followed by the upper-right and upper-left canine teeth (23.1% and 22.9%) and the upper-right and upper-left lateral incisors (22.0% and 20.7%). The mean bone density changes did not differ significantly between the cervical, intermediate, and apical portions of the teeth: 25.9%, 21.9%, and 23.9%, respectively. In short the mean reduction in bone density was found to be largest for the upper central incisors (29% and 26% respectively) and ranged from 20% to 23% for the other four teeth. This study also highlights the significant importance of CBCT as a modality for evaluating bone density around teeth during orthodontic treatment.

Sun Z, Smith T, Kortam S, Kim DG, Tee BC, Fields H (2011)[29] carried out a study to assess the accuracy of CBCT to measure the linear alveolar bone height and the thickness. For this purpose they obtained 6 frozen heads of domestic pigs. The section of bone containing the alveolar bone of the first molar (M1), and the third and second primary molars (P3 and P2) was separated and the soft tissue was removed. By using a dental bur, a straight groove was made at the occlusal surface of M1, P3, and P2. By using a digital caliper alveolar bone height was measured from the top edge of each marker hole to its corresponding alveolar bone crest by first investigator. After a 30-minute interval the procedure was repeated, and the average of measurement values was done direct bone-height measurements before bone reduction. With a dental bur, layers of bone with approximate thicknesses of 1.5 and 0.5 mm was removed from the distal plate. Direct measurements of postreduction alveolar bone height were made the same way as prereduction measurements. Alveolar bone-height and thickness were measured using CBCT images. Results were suggestive that a good to excellent repeatability can be achieved for alveolar measurements on CBCT images.

Ganguly R, Ruprecht A, Vincent S, Hellstein J, Timmons S, Qian F(2011)[30] conducted a study to evaluate the geometric accuracy of CBCT and to determine the accuracy to CBCT for linear measurements in the presence of soft tissues. This study was conducted on 6 embalmed cadaver heads with intact soft tissue. For the purpose of CBCT measurements radiopaque fiducial markers were placed on the buccal and lingual alveolar ridges and CBCT scans were made. Linear measurements were made using CBCT software tools. Physical measurements were made for the same points as measured on CBCT by using a digital caliper after sectioning the cadevar heads. Six paired (left and right) measurements were taken from each specimen using CBCT measurement tool and digital calipers comprising of three pairs of CBCT and three pairs of physical measurements. The average of three measurements at left or right side or the average of six measurements from the same specimen was used for the data analysis. The results suggested that there was an almost no or insignificant effect of soft tissue on the accuracy of measurements obtained by CBCT as compared to the measurements on digital caliper which is considered to be a gold standard.

Nahm KY, Kang JH, Moon SC, Choi YS, Kook YA, Kim SH et al. (2012)[31] conducted a study to test a null hypothesis that there exists no difference in the alveolar bone thickness, bone loss and in the incidence of fenestration and dehiscences between the upper and lower incisors in skeletal class I bi-dentoalveolar protrusive patients. They studied CBCT images of 24 of such patients. Four upper and four lower incisors were studied for measurement and each tooth was divided into 10 segments in the sagittal section to measure labial and the lingual bone thickness and other parameters. Results of this study rejected the null hypothesis and showed that there was a significant difference between the alveolar bone thickness of maxillary and mandibular incisors. The alveolar bone area was greater in the mandibular lingual region as compared to the mandibular labial region. The alveolar bone area of upper incisor was more compared to lower incisor. Percentage of bone loss was higher in lower anteriors and lower posteriors compared with upper anteriors and upper posteriors. This study also showed that the fenestration and alveolar bone loss were not only limited to the older patients or patients with generalized periodontal disease but was also seen in significant amount amongst the younger population. Incidence of fenestration was higher in lower anterior teeth than upper anterior teeth. This study suggested that prior to start of any orthodontic treatment, a thorough and comprehensive periodontal bone support evaluation should be performed for each individual upper and lower incisor, especially in bimaxillary dentoalveolar protrusive cases.

Enhos S, Uysal T, Yagci A, Veli I, Ucar FI, Ozer T (2012)[32] Conducted a study to test the null hypothesis that the presence of alveolar defects (dehiscence and fenestration) was not different among patients with different vertical growth patterns. A total of 1872 teeth in 26 hyper-divergent, 27 hypo-divergent, and 25 normo-divergent patients with no previous orthodontic treatment were evaluated using cone-beam computed tomography. Axial and cross-sectional views were evaluated with regard to whether dehiscence and/or fenestration on buccal and lingual surfaces existed or not. According to the results of this study, the hypo-divergent group (6.56%) had lower dehiscence prevalence than the hyper-divergent (8.35%) and normo-divergent (8.18%) groups. Higher prevalences of dehiscence and fenestration were found on buccal sides in all vertical growth patterns. Fenestration was found commonly over the maxillary alveolar region and dehiscence in the mandibular. The null hypothesis was rejected according to the results.

Ghassemian M, Nowzari H, Lajolo C, Verdugo F, Pirronti T, D'Addona A (2012)[33] carried out a study to measure the distance between the cemento-enamel junction (CEJ) and alveolar bone crest and the thickness of facial alveolar bone at points 1 to 5 mm from the bone crest for the six maxillary anterior teeth. Sixty-six tomographic scans (31 males and 35 females; aged 17 to 69 years; mean age: 39.9 years) of intact anterior maxilla were randomly selected and evaluated by two calibrated and independent examiners. A high variation of CEJ–bone crest (0.8 to 7.2 mm) was detected. A significantly larger CEJ–bone crest was measured in smokers and patients who were over 50 years old. The average bone thickness at 3 mm from the CEJ for the maxillary right central incisor was 1.41 mm and for the maxillary left central incisor was 1.45mm. For the maxillary right and left lateral incisors, the crestal bone thickness averaged 1.73 and 1.59 mm, respectively. For the maxillary right and left canines, the crestal bone thickness averaged 1.47 and 1.60 mm, respectively. The results of this study were conclusive that a thin facial bone is present over the six maxillary anterior teeth. Therefore, it is essential to make informed treatment decisions based on thorough site evaluation before immediate implant placement.

Ozdemir F, Tozlu M, Germec-Cakana D (2013)[34] evaluated the cortical bone thickness of the alveolar process with cone-beam computed tomography in patients with different facial types and increased facial heights. 155 CBCT images of adult patients (20-45 years old) who were grouped according to the low-angle, normal, and high-angle groups were studied. The thickness of the buccal cortical plates of the maxilla and the mandible, and the palatal cortical plates of the maxilla, were measured. Results of this study suggested that there was no statistically significant difference between the groups regarding mean ages, sex, and sagittal facial types.

Zhou Z, Chen W, Shen M, Sun C, Li J, Chen N (2013)[35] carried out a study for the evaluation of the effect of maxillary protrusion, tooth labio-lingual inclination and to evaluate the dimensions of nasopalatine canal and the labial bone anatomy at the maxillary anterior region. 80 cbct scan images of Chinese adults were evaluated in this study and the labial bone thickness was measured at following three levels: 3mm below the CEJ, at the mid root level and at the root apical level. In this study it was found that the mean thickness of labial bone at mid root and at 3 mm below the CEJ was less than 1mm and the least amount of labial bone thickness was noted at the root apical level. The results also suggested that there was a close anatomical relationship between the nasopalatine canal and central incisor root. Thus it was concluded that the labial bone is very thin and friable in the maxillary anterior region of Chinese adults.

Chugh T, Ganeshkar SV, Revankar AV, Jain AK (2013)[36] measured the cortical and cancellous bone density in the interradicular areas at the alveolar and basal bone levels of the maxilla and mandible. 109 CT scans of patients were studied and the bone density was measured in Hounsfield Units (HU). The results suggested that maxillary alveolar cortical bone density was between 1,020 and 1,520 HU, 888 HU in the buccal and 970 HU in the palatal cortical bone. 1,266 - 1,546 HU at the basal cortical bone. The cancellous bone in the mandible had densities between 456 and 492 HU at the alveolar bone and 453 and 518 HU at the basal bone. On comparing the basal bone was found to have significant higher density values for most of the interradicular areas than the alveolar bone for both the maxilla and mandible. The overall bone density was found to be significantly higher in the mandible than in the maxilla. The results of this study concluded that the highest bone density for maxillary arch was found between the second premolar and first molar for both the buccal and palatal cortical bones, and between the first and second molars for the buccal cortex of the basal bone. The least density was found in the maxillary tuberosity region in both both the alveolar and basal bones. It is therefore very important to have the knowledge of bone density in the maxilla and mandible which is helpful for correlating the clinical findings and helping the clinician to plan proper anchorage strategies and implant placement.

Choi SH, Kim YH, Lee KJ, Hwang CJ (2015)[37] conducted a study to investigate the how the inclination of tooth and the bone loss affects the amount of orthodontic force needed for carrying out out tipping movement and also evaluating the consequent stress on the pdl. A total of 20 3-D models of maxillary central incisors were created using a finite element analysis program (ANSYS ver. 12.1; Swanson Analysis System, Canonsburg, PA, USA) with different labial inclinations and different amounts of alveolar bone loss. The results showed that as labial inclination increased, the moment per unit of force decreased. In contrast, increases in alveolar bone loss caused increase in moment per unit of force. Thus it was concluded that when controlled tipping is applied to incisors, alveolar bone loss and labial tooth inclination causes an increase in the compressive and tensile stresses at the root apices. This finding suggested that if inadequate forces are applied on the facially inclined incisors it will lead to accumulation of greater stress at the root apices. The inadequate forces can futher induce external apical root resorption in teeth with alveolar bone loss compared with teeth without bone loss.

Dayoub N and Al-Sabbagh R (2015)[7] studied 68 upper incisors on CBCT to evaluate the supporting bone tissue thickness and its relationship with their inclination, and to investigate the impact of gender on these two variables. Results showed greatest amounts of supporting bone was noted in palatal apical region, followed by in the palatal middle third and labial apical regions of the root. The labial cervical and labial middle regions had the lowest values of bone thickness. In upper central incisors greatest amounts of supporting bone was noticed in the apical region of the root and least amount of bone tissue was located in the cervical region of both upper central incisors. According to these results, it can be concurred that the movement of the roots of both upper central incisors is relatively in safe range in the apical region due to the presence of the sufficient bone tissue in that region. Whereas there is a high risk in the cervical region especially on the labial side. To prevent such incidences it is safer and better to moving the roots of incisor by torque movement than by giving an uncontrolled inclination. They also found that the thickness of the supporting bone tissue in the labial apical region for both upper central incisors increases with the incisors inclination. Males had a greater amount of bone tissue in the palatal middle of the root than females and there is no effect of gender on the upper central incisors inclination.

Tian YL, Liu F, Sun HJ (2015)[2] carried out quantitative estimation of alveolar bone thickness of differently inclined maxillary central incisor using CBCT images of 90 maxillary central incisors from 45 patients who were divided into three groups based on the maxillary central incisors to palatal plane angle as lingual-inclined, normal and labial-inclined. Their study has concluded that in lingually inclined maxillary central incisors the alveolar bone thickness at the root apex is less as compared to the labially inclined central incisors. They also found a greater incidence of bone defects amongst the lingually inclined central incisors. Labial alveolar bone of lingually inclined central incisiors had more fenestrations. Lingually-inclined maxillary central incisors had lower alveolar bone thickness values at the root apex than patients with normal and labially inclined central incisiors. It was also found that the alveolar bone plate was thinnest at the marginal level.

Kheur MG, Kantharia NR, Kheur SM, Acharya A, Le B, Sethi T (2015)[38] studied CBCT images of 150 patients in their study which suggested that there is a positive correlation between the labial bone thickness to the labio-palatal bone width. The thickness of the palatal cortical plate is greater compared with the labial cortical plate in the anterior maxilla. The study also showed that the proclined incisors had a lower thickness of palatal bone at the apex than normally positioned teeth. These factors should be considered vital in cases of immediate implant placements in which palatal bone available is very less.

Sadek MM, Sabet NE, Hassan IT (2014)[39] studied 152 CBCT scans of which 45 scans were included in the study and CBCT generated lateral cephalograms were used to categorize subjects into three groups based on their vertical skeletal pattern as high angle, normal angle and the low angle groups. These categories were determined using the cephalometric measurements of face height index and mandibular plane angle. Their study showed that the alveolar thickness in the upper arch of the high-angle group had significantly thinner alveolus compared to the low-angle group in the anterior region and the lowest mean distance was obtained between the tooth apex and the palatal cortex, no significant differences were found for the posterior region. The results revealed that high angle group had largest anterior dentoalveolar height in both maxilla and mandible and also the largest distance from the apex of upper central incisor to the palatal plane. Low angle groups showed the lowest mean in all measurements. In the posterior region no statistically significant difference was fround between any of the three groups studied. Longest mandibular canine to canine height was observed in high angle group. Thinnest alveolar bone was noted in high angle group in the anterior region at the apex and at the mid-root level in the lower arch. Conclusion obtained from the results of this study was that alveolar thicknesses of patients with a hyperdivergent pattern have a narrower alveolus compared to the normal and low-angle groups. Therefore, it is advisable to carry out limited antero-posterior movements in high-angle patients.

Fuentes R, Flores T, Navarro P, Salamanca C, Beltrán V, Borie E (2015)[40] carried out a study to analyze the anatomical dimensions of the buccal bone walls of the aesthetic maxillary region for immediate implant placement, based upon cone-beam computed tomography (CBCT) scans in a sample of adult patients. Two calibrated examiners analyzed a sample of 50 CBCT scans, performing morphometric analyses of both incisors and canines on the left and right sides. The heights of the buccal and palatal bone ridges were determined at the major axis of the tooth and the buccal bone thickness was measured across five lines. Results showed that the mean of the buccal wall thicknesses in the central incisors, lateral incisors and canines were 1.14±0.65 mm, 0.95±0.67 mm and 1.15±0.68 mm, respectively. The age and gender did not show significant differences in heights between the palatal and buccal plates. Less than 10% of sites showed more than a 2-mm thickness of the buccal bone wall, with the exception of the central incisor region, wherein 14.4% of cases were ≥2 mm. This study highlighted the predominance of thin buccal bone thickness in the aesthetic maxillary region.

Alsaff ZJ, Shafshak SM, Shokry SM (2016)[41] conducted a retrospective observational study on 108 maxillary anterior teeth with an aim to measure alveolar bone thickness and height of the labial and palatal surfaces of maxillary anterior teeth for each tooth at three levels cervical, middle and apical in Saudi population using cone-beam computed tomography (CBCT). The results of their study showed that the thickness of the palatal plate was greater than that of the facial plate and that a positive correlation exists between the crest, mid, and apical third thicknesses. The alveolar bone loss in the vertical direction correlated with the thickness of alveolar bone plate. The degree of vertical bone loss was found to be greater on the labial than on the palatal surfaces. Vertical alveolar bone loss increased significantly at the canine. The thickness of labial and palatal alveolar bone was greater in males than in female patients in both the apical and the middle thirds locations. At the level of the alveolar crest, the thickness of the alveolar bone was greater in female than in males.

This study also stated that female patients have a less severe bone loss than male patients.

Khoury J, Ghosn N, Mokbel N, Naaman N (2016)[42] carried out a study to measure the facial bone thickness overlying maxillary anterior teeth according to the periodontal biotype, the tooth position, and the bucco-palatal inclination of the tooth. CBCT images of 47 patients were included and the periodontal biotype and the buccopalatal inclination were examined for all maxillary anterior teeth as well as of the sagittal tooth position. Buccal bone thickness was measured at 4, 6, 8, and 10 mm apical to the cement–enamel junction (CEJ). Results showed that at 4 mm from the CEJ, mean buccal bone thickness was 1.0 mm for all teeth and it decreased gradually and significantly in apical direction (6, 8, and 10 mm). A thin biotype was associated with a labial plate thickness half that of a thick biotype at all 4 distances from the CEJ. The study concluded that the maxillary anterior teeth have a thin buccal plate and only 3.5% of all maxillary anterior teeth had a buccal plate thickness greater than 2 mm.

Jäger F, Mah JK, Bumann A (2017)[43] conducted a study to quantify treatment-related changes in peridental bone height and thickness in orthodontic patients. Cone-beam computed tomographs (CBCTs) of 43 patients (24 female, 19 male; mean age: 25 years, 5 months) who underwent orthodontic treatment with multibracket appliances for at least 1 year were chosen for retrospective evaluation. Dehiscence depth and changes in bone width and tooth inclination were determined on 954 teeth. Results showed that a ninety percent of patients younger than 30 had a reduced bone height (dehiscence) of the periodontium of at least one tooth.

Their study suggested that a pretreatment, three-dimensional assessment (using CBCT) should be indicated, especially in patients over 30 years old before carrying out buccal tooth movement.

Jung YH, Cho BH, Hwang JJ (2017)[44] conducted a retrospective study on CBCT images of 398 maxillary central and lateral incisors from 199 patients. The root position in the alveolar bone was classified as buccal, middle, or palatal, and the buccal type was further classified into subtypes I, II, and III also the buccolingual inclination of the tooth and buccal bone thickness were evaluated. Subtype I: the incisor root were covered by the buccal bone wall, and the bone thickness increased toward the apex. Subtype II: the incisor root was covered by a thinner buccal bone wall than in subtype I and the bone thickness did not noticeably increase toward the apex that is covered by the bone tissue in the long axis of the tooth. Subtype III: the axis of the apex was angulated very buccally and the apex was not covered by the bone tissue in the long axis of the tooth. The results of their study showed that the 64.3% of the central incisors were classified as subtype I and 67.6% of the lateral incisors were classified as subtype II. Only 2 lateral incisors (0.5%) were positioned more palatally. The mean thickness of the facial bone wall was 0.92 mm at the central incisors and 0.57 mm at the lateral incisors. The maxillary lateral incisors demonstrated a significantly thinner buccal bone thickness than the central incisors. They found a significant relationships between the root position in the alveolar bone, the angulation of the tooth in the alveolar bone, and buccal bone thickness. CBCT analyses of the buccal bone and sagittal root position was recommended before planning of any treatment approach.

Kalbassi S, Chiong FW, Cheau HY, Chew WH (2017)[45] carried out a retrospective cross-sectional study on 18 Singaporean Chinese patients which included CBCT images of 85 teeth. The results showed that the thickness of buccal bone is the lowest in the incisor and canine reigns with no significant difference between canine and incisor groups. The thickness of the alveolar bone in premolar region is significantly greater than incisor and canine regions, but lesser than molar region, so the thickest buccal bone is associated with molar area. No significant differences were found regarding buccal bone thickness between maxillary and mandibular incisors and canines also no significant differences were found regarding buccal bone thickness between maxillary and mandibular incisors and canines.

Chaurasia A, Katheriya G, Patil R (2017)[46] studied cone beam images (Sagittal sections) of 101 patients (61 male and 40 females). Thus a total of maxillary (101) and mandibular incisors (101) were included to evaluate the age and sex related changes in inclination angle, age and sex prediction on the basis of inclination. Their study also evaluated bone thickness of maxillary central incisor/mandibular central incisors and relationship of maxillary central incisor with inclination angle and to investigate the impact of age and gender on the alveolar bone thickness. They found that the mean of inclination angle is approximately same in males and females and this correlation is statistically not significant. The inclination angle in age groups was statistically non-significant (P value>0.05). The supporting alveolar bone thickness in maxillary labial and palatal except maxillary palatal in middle of root was statistically non-significant (P>.05). The alveolar bone thickness in mandibular labial and mandibular lingual side was also statistically non-significant (P>.05).

Singh A, Chandra S, Agarwal DK, Bhattacharya P (2017)[9] conducted a study to evaluate the changes occurring in the alveolar bone thickness during anterior retraction after premolar extraction. 10 maxillary as well as mandibular arches were included in the study that required retraction of anterior teeth after premolar extraction. En masse retraction was carried out using sliding mechanics in lower arch and loop mechanics in upper arch. The pre treatment and post treatment CT scans were evaluated to record the changes in the width of the alveolar bone at three levels S1, S2 and S3 for labial, palatal (lingual) and total alveolar bone. The results showed that the maxillary labial alveolar bone thickness reduced at crestal level and increased at mid root and apical level. The maxillary palatal alveolar bone thickness reduced at all the three levels. After anterior retraction the maxillary labial alveolar bone thickness was found to be reduced at crest level and was found to be increased at mid root and apical level. The maxillary palatal alveolar bone thickness was found to be reduced at all the three levels.

Bae SM, Kim HJ, Kyung HM (2018)[47] conducted a study to evaluate the long-term changes of the anterior palatal alveolar bone after treatment with bialveolar protrusion using computed tomography. In this case report the treatment of a 31-year-old woman with a convex profile, protrusive maxilla, retrusive mandible, and gummy smile is discussed. Four premolars were extracted, and micro-implant anchorage was used to retract the anterior teeth. Lip protrusion and the gummy smile were improved, but the computed tomography images showed dehiscence on the palatal alveolar bone of the maxillary incisors. Approximately 10 years after treatment a significant alveolar bone apposition was seen on the palatal surface of the maxillary anterior teeth.

MATERIALS AND METHOD

After getting an ethics clearance from the ethics committee of the institution this retrospective observational study was carried out to evaluate alveolar bone thickness and density around maxillary central incisors of different inclinations using cone-beam tomography.

The data on mean values of lingual alveolar bone thickness observed by **Tian YL et al. (2015)**[2] was referred to estimate the sample size for the proposed study. The difference in the mean values of Lingual-inclined group, normal group and labial-inclined group at level 1 was maximum although insignificant. This data was used to obtain the effect size, which was 0.2535. This resulted into a sample size of 153 i.e. 51 samples per group, rounded to 50 samples per group (Total: 150), which can provide the desired effect with 80% power (one-way ANOVA) and with 95%

confidence level. The 150 CBCT images evaluated in this study were obtained from a local imaging centre.

MATERIALS USED:

1) 150 CBCT images displaying maxillary central incisors.

2) 14-inch LCD monitor using Dell intel (R) core (TM) i3-3227U CPU @ 1.90 GHz processor, 64-bit operating system having product ID : 00261-30000-AA825

3) Kodak 9000 3D Digital imaging machine, having exposure parameters of 70-74 kvp, 10 mA and 10.8sec. The field of view (FOV) size of this machine was 174 $mGycm^2$ and image resolution was of 200-µm.

INCLUSION CRITERIA

1. Good quality images with high standard resolution CBCT images displaying maxillary central incisors
2. Age range of 18-36 years.

EXCLUSION CRITERIA

1. Patients with decayed teeth in the anterior region.
2. Patients with poor periodontal condition in the anterior region.
3. Patients with crowding in the anterior region.
4. Patients with peri-apical pathology in the anterior region.
5. Patients with prosthodontic crowns or bridges in the anterior region.
6. Patients with craniofacial dysmorphology (cleft lip & cleft palate defects) .

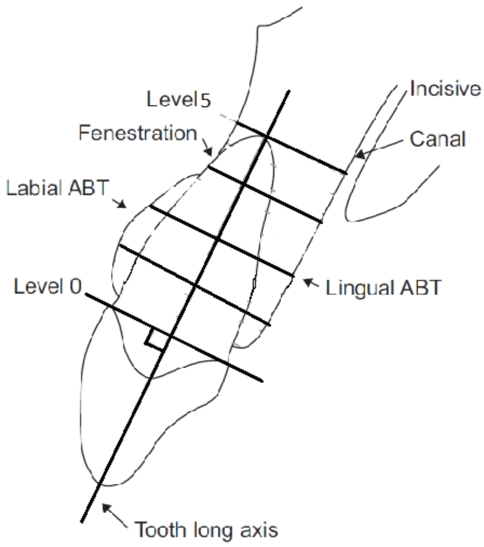
Method

3D CBCT images with voxel size 0.3mm were acquired with an exposure time of 20 seconds at 0.75A, 110 kV and axial slice thickness of 0.3mm. Reconstruction of the data was performed with CS 3D Imaging software to create three-dimensional projection of images with maximum intensity for making linear measurement. Measurement of the density was done using gray scale of the same software.

According to the angle formed between the long axis of maxillary central incisor and the palatal plane, 3 groups each consisting of 50 central incisors was formulated on the basis of angle of inclination as follows:

1. Lingually inclined group (angle $<110.1^o$)
2. Normally inclined group (110.1^o-to-121.5^o)
3. Labially inclined group (angle$>121.5^o$)

A mid sagittal section showing maximum root length was selected for each tooth and the root length was determined by measuring the distance from CEJ to the root apex. The root length was divided into 04 segments in sagittal sections and the labial and the lingual thickness of the alveolar bone perpendicular to the long axis of tooth was measured linearly at each level.



All the slices were then examined for any alveolar bone defects and the site showing defect in the cortical bone around the root at any level was considered as an alveolar bone defect.

Defects greater than 2 mm from CEJ were considered as dehiscence while those identified as an opening through alveolar bone exposing the root surface but not involving CEJ were considered as fenestration.

The density of alveolar bone was measured at each of the five levels individually on labial and lingual surfaces of maxillary incisors as gray scale values.

After all the measurements were recorded in the data sheet for all the patients, the same measurements were repeated and the average of the two readings was taken as the final measurement to avoid individual bias.

Statistical methods

The demographic characteristic like age was expressed in terms of mean and standard deviation for all the three study groups. The comparison of differences in means was performed using one-way analysis of variance (ANOVA). The gender distribution between groups was compared using Chi-square test. The comparison of mean angle of inclination across groups was performed using one-way ANOVA for males and females independently. The paired comparison was performed using Tukey's post-hoc test. On similar lines, the average root length was compared across groups. The overall average labial thickness was compared across groups at each level using one-way ANOVA, along with Tukey's post-hoc test. The analysis was performed independently for males and females. Also the comparison of mean thickness between gender was performed at each level using t-test for independent samples. Similarly, analysis was carried out for average gray scale at each level across groups. The same analysis was performed at lingual side for mean thickness and gray scale. The fenestration was compared across three groups using Chi-square test. The analysis was performed for males and females independently. Also, the dehiscence was compared across groups using Chi-square test for males and females independently.

All the analyses were performed using SPSS ver 20.0 (IBM Corp) and the statistical significance was tested at 5% level.

If $x_1, x_2, \ldots x_n$ are the observations on random variable X, then

A) Sample mean for a set of observations is given by

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

B) Standard deviation for a set of observations in given by

$$s = \sqrt{\frac{1}{(n-1)}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

where x_i = observation on each object
n = number of objects

C) Student's t-test for independent samples

The test is used for comparing the statistical significance of difference in the means of two samples. It compares the sample difference between two means in relation to the variation in the data (expressed as the standard deviation of the difference between the means).

It is given by the formula:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{s_{(\bar{x}_1 - \bar{x}_2)}}$$

where $\bar{x}_1$ and $\bar{x}_2$ are the means of sample observations of two different groups, μ_1 and μ_2 are the means of the respective populations from which the samples are derived, and $s_{(\bar{x}_1 - \bar{x}_2)}$ is the pooled sample standard deviation, which is given by:

$$s(\bar{x}_1 - \bar{x}_2) = \sqrt{\frac{s^2{}_{pooled}}{n_1} + \frac{s^2{}_{pooled}}{n_2}}$$

where

$$s^2{}_{pooled} = \frac{(n_1 - 1)s_1{}^2 + (n_2 - 1)s_2{}^2}{n_1 + n_2 - 2}$$

here $s_1{}^2$ and $s_2{}^2$ are the variance of two samples and n_1 and n_2 are the sample sizes in two groups.

If the test statistic results in a P-value > 0.05 (level of significance), then the null hypothesis H_0: *There is insignificant difference in the means of two groups* is accepted and the alternative hypothesis H_1: *There is significant difference in the* *means* is rejected. On the other hand, if *P*-value < 0.05, then the H_1 is accepted and H_0 is rejected.

D) One-way Analysis of variance

Analysis of variance (ANOVA) is used to test the significance of difference in the mean of three or more groups. The basic assumption is that the variable of interest is normally distributed in the population under study.

Method

Here the interest is to test the null hypothesis that the population means are same, i.e.

$$H_0 : \mu_1 = \mu_2 = ...\mu_m$$

against the alternative H_1 that they are not same.

Some of the statistics computed to test the hypothesis are as below:

i) Grand mean: It is the mean of set of all observations in the studied groups and is given by:

$$\bar{x}_{GM} = \frac{1}{N}\sum_{i=1}^{N} x_i$$

ii) Total sum of squares: It is the sum of squares of each observation from the grand mean and is given by:

$$TSS = \sum_{i=1}^{N} (x_i - \bar{x}_{GM})^2$$

Total sums of squares is the sum of two components i.e., variation between groups and within groups.

iii) Between group sum of squares

$$SSB = \sum_{j=1}^{m} n_j (\overline{x}_j - \overline{x}_{GM})^2$$

iv) Within group sum of squares

$$SSW = \sum_{j=1}^{m} \sum_{i=1}^{n} (x_{ij} - \overline{x}_j)^2$$

The mean sum of squares is obtained by dividing the above sum of squares with the respective degrees of freedom, i.e. N-1, p-1 and $p(n$-1).

v) F-statistic: It is the ratio of between and within mean sum of squares

$$F = \frac{MS_{Between}}{MS_{Within}}$$

If the p-value based on F-statistic is greater than 0.05, H_0 is accepted, otherwise H_1 is accepted.

vi) Tukey's post-hoc test

After performing ANOVA, if alternative hypothesis H_1 is accepted, then the subsequent interest is to determine the pair wise significance of difference in the means of study groups. This could be carried using Tukey's post-hoc test. The difference between the means of all groups are determined and compared with this critical difference called the honest significant difference (HSD). It is given by:

$$HSD = q\sqrt{\frac{MS_{within}}{n}}$$

where, q is the studentized range statistic derived from the tables, n is the sample size and the mean square value is from the ANOVA analysis. If the critical difference exceeds the absolute difference between any two sample means, then the corresponding means differ significantly.

E) Chi-square test

Let *X* and *Y* be two variables under study with *r* and *s* levels respectively; and the data on *r* □ *s* levels be in the form of counts. Let the null hypothesis be that the two variables are independent. That is, knowing the levels of *X* does not help in predicting the levels of *Y*; against the alternative hypothesis that the two factors are not independent. That is, knowing the level of *X* can help in predicting levels of *Y*. To decide about the acceptance of hypothesis, the Chi-square test statistic is used which is defined as:

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{s} \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where O_{ij} is the observed frequency count for i^{th} level of variable *X* and j^{th} level of variable *Y*. E_{ij} is the expected frequency count for same cell. The expected count is given by

$$E_{ij} = \frac{n_i \times n_j}{n}$$

where n_i and n_j are the total counts for i^{th} level of variable *X* and j^{th} level of variable *Y*; and *n* is the total count. The calculated Chi-square value is compared with the tabulated one for (*r*-1)□(*s*-1) degrees of freedom. If the corresponding *p*-value is smaller than the pre-decided significance level, say 0.05, then we reject the null hypothesis and accept the alternative one. If the *p*-value is more than 0.05, then we accept null hypothesis.

RESULTS

Table 1: Comparison of demographic profile of individuals across three study groups.

Table 1 provides the comparison of demographic profile of individuals across three study groups. The mean age in group I was 25.54 ± 4.92 years, while in group II, the mean age was 27.32 ± 4.22 years and 26.04 ± 5.38 years in group III. The difference in the mean age across study groups was statistically insignificant as indicated by p-value 0.1718. As regard gender, there were 24 (48%) males and 26 (52%) females in group I, followed by group II, where there were 25 (50%) males and 25 (50%) females. In group III, there were 28 (56%) males and 22 (44%) females. The gender distribution was insignificantly different across groups as revealed by p-value 0.7065.

Table 2: Comparison of mean angle of inclination according to gender across each study groups.

Table 2 represents the comparison of average angle of inclination according to gender, as well as overall inclination across three study groups. One-way ANOVA across three groups and pairwise analysis between groups was performed using Tukey's HSD test. In male category, the mean value of average angle of inclination for group I was 105.40 o ± 5.55o, for group II it was 114.72o ± 11.42o and for group III it was 127.82o ± 4.08o. The difference of means was highly significant as indicated by p-value of < 0.0001. On similar lines, the mean values in female category for group I was 106.23o ± 3.73o, for group II it was 117.58o ± 1.66o and for group III it was 126.64o ± 3.59o. The difference in means was also significantly different between groups with p-value < 0.0001. The overall status also indicated that the difference in mean value was highly statistically significantly significant (p-value < 0.0001). Pairwise analysis suggested that the mean value of average angle of inclination between groups was statistically significantly different as indicated by different superscripts.

Table 3: Comparison of average root length according to gender in each study group.

Table 3 represents the comparison of means of average root length of all individuals across three study group. As regard to gender, in male category, the mean of average root length for group I was 13.05 ± 1.30 mm, for group II it was 13.17 ± 0.99 mm and for group III it was 13.57 ± 1.45 mm. The difference of means was statistically insignificant as indicated by p-value of 0.2999. On similar lines, the mean value for females in group I was 12.71 ± 2.25 mm, in group II was 14.02 ± 7.89 mm and in group III was 13.92 ± 7.21 mm. The difference of means was also statistically insignificant for female category as indicated by p-value of 0.5912. The mean value of average root length for combined set in group I was 12.71 ± 2.25 mm, in group II was 14.02 ± 7.89 mm and in group III was 13.92 ± 7.21 mm. The difference of means was statistically insignificant as revealed by p-value 0.5162.

Table 4: Comparison of average labial bone thickness of all individuals across three study groups at different root levels.

Table 4 provides the comparison of mean labial bone thickness of all individuals across three study groups at different root levels. At level 1, the mean value of average labial thickness in group I was 1.95 ± 0.97 mm, while in group II it was 2.24 ± 0.92 mm and in group III it was 2.74 ± 1.47 mm. The difference of means across groups was statistically significant with p-value of 0.0029. Tukey's pairwise analysis suggest that the mean value in group III was significantly higher than group I, while group II mean value was insignificantly different than group I and III. At level 2, the mean value of average labial thickness between three groups was significantly different with p-value of 0.0050. Further, pairwise analysis revealed that the mean value in group III (1.16 ± 1.04 mm) was significantly higher than group I (0.69 ± 0.68 mm) and group II (0.78 ± 0.41 mm). There was insignificant difference between group I and group II. At remaining levels, the difference of mean labial thickness across groups was insignificantly different as indicated by p-values were greater than 0.05.

Table 4a: Comparison of mean labial bone thickness in males across three study groups at different root levels.

Table 4a provides the comparison of mean labial bone thickness in males across three study groups at different root levels. At level 1, the mean value of average labial thickness in group I was 1.81 ± 0.72 mm, while in group II, it was 2.45 ± 0.97 mm and in group III, it was 2.89 ± 1.71 mm. The difference of means across groups was statistically significant with p-value of 0.0097. Tukey's pairwise analysis suggested that the mean value in group III was significantly higher than group I, while group II mean value was insignificantly different than group I and III. At root level 2, the mean value of average labial thickness across groups was significantly different with p-value 0.0009. Further, pairwise analysis revealed that the mean value in group III (1.43 ± 1.23 mm) was significantly higher than group I (0.59 ± 0.39 mm) and group II (0.85 ± 0.32 mm). There was no statistically significant difference between group I and group II. For remaining levels, the difference of mean labial thickness across groups was statistically insignificant as indicated by p-values were greater than 0.05.

Table 4b: Comparison of mean labial bone thickness in females across three study groups at different root levels.

Table 4b provides the comparison of mean labial bone thickness in females across three study groups at different root levels. At level 4, the mean value of average labial thickness between three groups was statistically significantly different with p-value 0.0303. Pairwise analysis revealed that the mean value in group III (1.05 ± 1.00 mm) was statistically significantly higher than group I (0.59 ± 0.38 mm). There was no statistically significant difference between group II and I as well as group II and III. For remaining root levels, the difference of mean labial thickness across study groups was statistically insignificant as indicated by p-values were greater than 0.05.

Table 4c: Comparison of mean labial bone thickness gender wise at each level in three study groups.

Table 4c provides the comparison of mean labial thickness between males and females in each group. In group III at level 2, the difference of means between males (1.43 ± 1.23) and females (0.82 ± 0.59) was statistically significant with p-value 0.0377. All other comparisons in each group and at different levels were insignificantly difference as indicated by p-values more than 0.05.

Table 5: Comparison of average lingual bone thickness of all individuals across three study groups at different root levels.

Table 5 provides the comparison of mean lingual bone thickness of all individuals across three study groups at different root levels. At root level 1, the mean value of average lingual thickness in group I was 8.49 ± 2.83 mm, while in group II, it was 7.28 ± 2.00 mm and in group III, it was 6.20 ± 1.87 mm. The difference of means across groups was statistically highly significant as p-value < 0.0001. Tukey's pairwise analysis suggests that the mean value in group I was significantly higher than group II and III. At root level 2, the mean value of average lingual thickness across three groups was also highly statistically significantly different with p-value < 0.0001. Pairwise analysis revealed that the mean value in group III (3.52 ± 1.46 mm) was significantly lower than group I (5.19 ± 1.93 mm) and group II (4.42 ± 1.56 mm). There was no statistically significant difference between group I and group II. There was statistically significant difference of mean values across three groups as indicated by p-value 0.0288 at root level 3. Pairwise analysis suggest that the mean value of average lingual thickness in group I (3.34 ± 1.43 mm) was significantly higher than group III (2.52 ± 1.83 mm), while group II (2.92 ± 1.21 mm) showed insignificant difference between group I and III. For remaining root levels, the difference of mean lingual thickness across three study groups was statistically insignificant with p-values greater than 0.05.

Table 5a: Comparison of mean lingual bone thickness in males across three study groups at different root levels.

Table 5a provides the comparison of mean lingual bone thickness in males across three study groups at different root levels. At root level 1 and 2, the differences of mean values of average lingual thickness were significantly different across three groups as revealed by p-values 0.0179 and 0.0012 respectively. Pairwise analysis suggested that the mean value in group I was significantly higher than group III; however, group II showed insignificant difference from that of group I and III. For remaining root levels, the difference of mean lingual thickness between three study groups was statistically insignificant as indicated by p-values greater than 0.05.

Table 5b: Comparison of mean lingual bone thickness in females across three study group at different root levels.

Table 5b provides the comparison of mean lingual bone thickness in females across three study groups at different root levels. At root level 1, the mean value of average lingual thickness in group I was 8.08 ± 2.88 mm, while in group II, it was 6.36 ± 1.17 mm and in group III, it was 5.05 ± 1.09 mm. The difference of mean values across groups was statistically highly significant with p-value < 0.0001.

Tukey's pairwise analysis suggested that the mean value in group I was significantly higher than group II and III. At root level 2, the mean value of average lingual thickness across three groups was also highly significantly different with p-value < 0.0001. Pairwise analysis revealed that the mean value in group III (2.77 ± 0.92 mm) was statistically significantly lower than group I (4.48 ± 1.53 mm) and group II (3.69 ± 1.04 mm). There was statistically insignificant difference between group I and II. At level 3, there was statistically significant difference in mean values across three groups as indicated by p-value 0.0074. Pairwise analysis suggested that the mean value of average lingual thickness in group I (2.85 ± 1.00 mm) was statistically significantly higher than group III (1.95 ± 0.84 mm), while group II (2.53 ± 1.00mm) showed insignificant difference with that of group I and III. For remaining root levels, the difference of mean lingual thickness across three study groups was obtained statistically insignificant as indicated by p-values greater than 0.05.

Table 5c: Comparison of mean lingual bone thickness gender wise at each level in three study groups.

Table 5c shows the mean lingual thickness for gender types in each group and at each level. It is evident that at level I in group II, the difference of mean lingual thickness between males and females was statistically significant with a p-value of 0.0007. Similarly, in group III, the difference was significant with p-value of 0.0001. At level II, the difference of means in all the three groups were statistically significant between males and females with p-values 0.0051, 0.0005 and 0.0008 respectively. At level 3, the differences were significant in group I and II with p-values 0.0108 and 0.0203. At level 4, the difference was significant in group I with p-value of 0.0117. Remaining comparisons showed statistically insignificant differences.

Table 6: Comparison of average gray scale values of all individuals across three study groups at different root levels - Labial side.

Table 6 provides the comparison of mean values of average gray scale values for individuals across three study groups at different root levels on labial side. The differences were statistically significant difference across groups at root level 1 and 2 with p-values 0.0354 and 0.0002 respectively. At both the levels, Tukey's post-hoc test revealed that the mean value of average gray scale was significantly lower in group I as compared to group II and III. The difference of means between group II and III were statistically insignificant.

Table 6a: Comparison of mean gray scale values in males across three study groups at different root levels - Labial side.

Table 6a provides the comparison of mean values of average gray scale values in males across three study groups at different root levels on labial side. There was statistically significant difference across groups as determined by one-way ANOVA at root level 2 with p-value of 0.0072. Tukey's post-hoc test revealed that the mean value of average gray scale was statistically significantly lower in group I (944.42 ± 555.77) as compared to group III (1319.39 ± 251.03). There were no statistically significant differences between group II and I as well as group II and III at this level.

Table 6b: Comparison of mean gray scale values in females across three study groups at different root levels - Labial side.

Table 6b provides the comparison of mean values of average gray scale in females across three study groups at different root levels on labial side. There was statistically significant difference between groups at root level 2 with p-value 0.0259.

Tukey post-hoc test revealed that the mean value of average gray scale was significantly lower in group I (840.37 ± 587.55) as compared to group III (1238.41 ± 483.23). There were no statistically significant differences between group II and I as well as group II and III at this level.

Table 6c: Comparison of mean gray scale values gender wise at each level in three study groups – Labial side.

Table 6c provides the comparison of mean gray scale values between males and females in each group. In group II at level 4, the difference of means between males (826.32 ± 322.71) and females (1052.58 ± 311.13) was statistically significant with p-value 0.015. All other comparisons in each group and at different levels were insignificantly difference as indicated by p-values more than 0.05.

Table 7: Comparison of average gray scale values of all individuals across three study groups at different root levels - Lingual side.

Table 7 provides the comparison of mean values of average gray scale values across three study groups at different root levels on lingual side. The differences across groups were statistically significant at root levels 2 and 3 with corresponding p-values 0.0165 and 0.0347 respectively. Tukey post-hoc test revealed that the mean value was significantly lower in group I as compared to group III, while group II showed statistically insignificant difference with that of group I and III.

Table 7a: Comparison of mean gray scale values in males across three study groups at different root levels - Lingual side.

Table 7a provides the comparison of mean values of average gray scale values in males across three study groups at different root levels on lingual side. There were statistically insignificant differences across groups at different root levels as revealed by p-values greater than 0.05.

Table 7b: Comparison of mean gray scale values in females across three study groups at different root levels - Lingual side.

Table 7b provides the comparison of mean values of average gray scale values in females across three study groups at different root levels on lingual side. There was statistically significant difference across groups at root level 2 with p-value of 0.0164. Tukey's post-hoc test revealed that the mean value was significantly lower in group I (909.10 ± 376.81) as compared to group III (1207.18 ± 369.62), while group II (992.80 ± 319.48) showed statistically insignificant difference with that of group I and III.

Table 7c: Comparison of mean gray scale values gender wise at each level in three study groups – Lingual side.

Table 7c provides the comparison of mean gray scale values between gender types in each group at each level. At level 2 in group I, the difference of mean gray scale values was statistically significant with p-value of 0.0093, followed by in group III, with p-value of 0.0002. At level 3 in group II, the difference was significant with p-value of 0.0458 and in group III, it was significant with p-value of 0.0132. At level

4 in group III, the difference was significant with p-value of 0.0045. In the remaining comparisons, the difference was statistically insignificant.

Table 8: Comparison of the frequency of fenestrations across three study groups - Overall.

Table 8 shows the comparison of frequency of fenestrations across three study groups in all individuals. Out of 50 individuals in each group, 12 (24%) individuals in group I, 10 (20%) in group II and 6 (12%) in group III showed fenestration positive. The distribution of cases was insignificantly different across groups as revealed by p-value of 0.2924.

Table 8a: Comparison of the frequency of fenestrations across three study groups - Males.

Table 8a shows the comparison of frequency of fenestrations across three study group in male group. Out of 24 males in group I, 7 (29.17%) showed fenestration positive, in group II, there was only 1 (4%) case of fenestration out of 25 males and in group III out of 28 males, 2 (7.14%) cases showed positive fenestration. The difference of distribution across groups was statistically significantly different as indicated by p-value of 0.0166.

Table 8b: Comparison of the frequency of fenestrations across three study groups - Females.

Table 8b shows the comparison of frequency of fenestrations across three study groups in female group. There were 5 (19.23%) females who were fenestration positive out of 26 females in group I, while group II had 9 (36%) females out of total 25 and in group III, out of 22 females, there were 4 (18.18%) positive cases. The difference in the distribution was statistically insignificant across three groups as revealed by p-value of 0.2671.

Table 8c: Comparison of frequency of fenestrations across three study groups – Gender wise.

Table 8(c) provides gender wise distribution of patients according to fenestration in three groups. It is evident from the table that in group II, the proportion of females with positive fenestration was significantly higher than that of males with p-value of 0.0133. In other two groups, the distribution of cases with fenestration was insignificantly different.

Table 9: Comparison of the frequency of dehiscence across three study groups – Overall.

Table 9 shows the comparison of dehiscence across three study groups. Out of 50 individuals in each group, 2 (4%) individuals in group I, 2 (4%) in group II and 4 (8%) in group III showed presence of dehiscence. The difference was statistically insignificant as revealed by p-value of 0.5897.

Table 9a: Comparison of the frequency of dehiscence across three study groups – Males.

Table 9a shows the comparison of dehiscence across three study groups in male group. There was no case of dehiscence in group I, while group II had 2 (8%) males out of total 25 and in group III, out of 28 males, there were 2 (7.14%) cases of dehiscence. The difference in the distribution of cases was statistically insignificant across three groups as indicated by p-value 0.3809.

Table 9b: Comparison of the frequency of dehiscence across three study groups - Females

Table 9b shows the comparison of dehiscence across three study groups in female group. There were 2 (7.69%) females with dehiscence out of 26 females in group I, while group II had no case and in group III, out of 22 females there were 2 (9.09%) positive cases. The difference in the distribution was statistically insignificant across three groups as indicated by p-value of 0.3248.

Table 9c: Comparison of frequency of dehiscence across three study groups – Gender wise.

Table 9c provides the gender wise distribution of patients according to dehiscence in three groups. It is evident from the table that the gender wise distribution of patients was insignificantly different in each group as indicated by p-values more than 0.05.

Colour Plate 1

FIGURE 1: CBCT MACHINE

Colour Plate 2

MEASUREMENT OF ANGLE OF INCLINATION

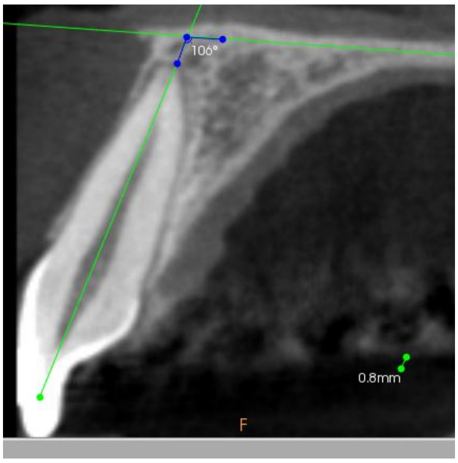


FIGURE 2: Lingually inclined group(Group I)

FIGURE 3: Normally inclined group (Group II)

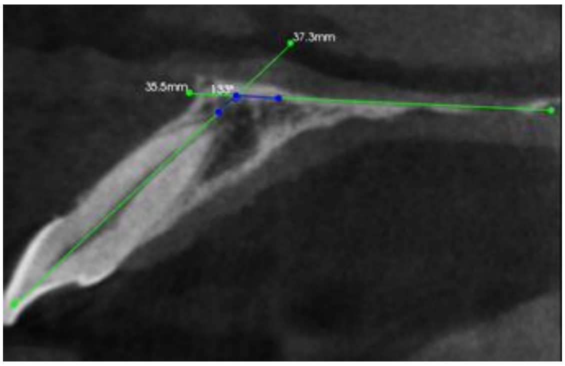


FIGURE 4 : Labially inclined group(Group III)

Colour Plate 3

MEASUREMENT OF ROOT LENGTH

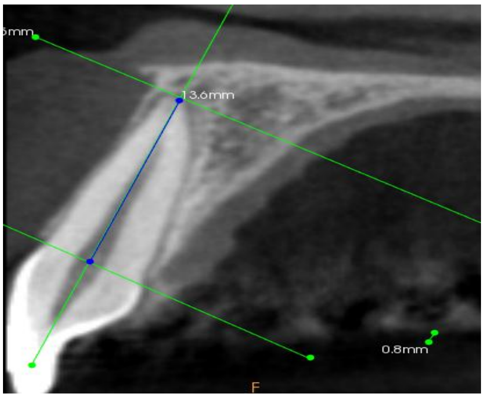


FIGURE 5 : Lingually inclined group(Group I)

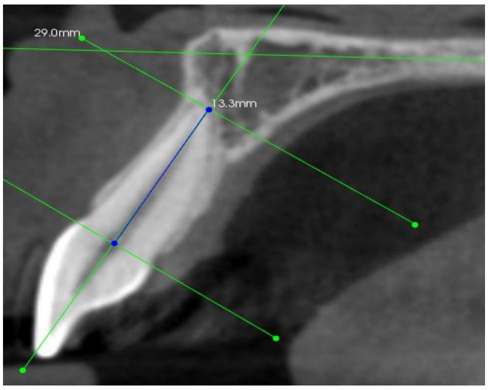


FIGURE 6 : Normally inclined group(Group II)

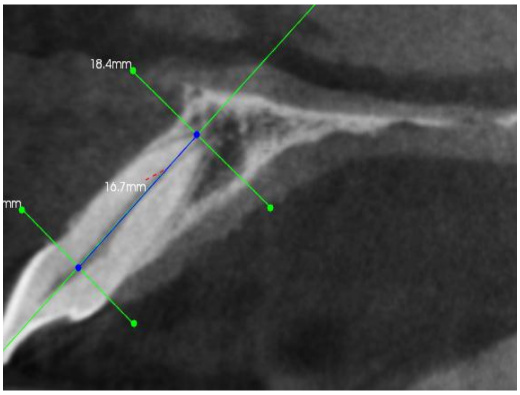


FIGURE 7 : Labially inclined group(Group III)

Colour Plate 4

DIVISION OF ROOT LENGTH INTO 5 LEVELS.

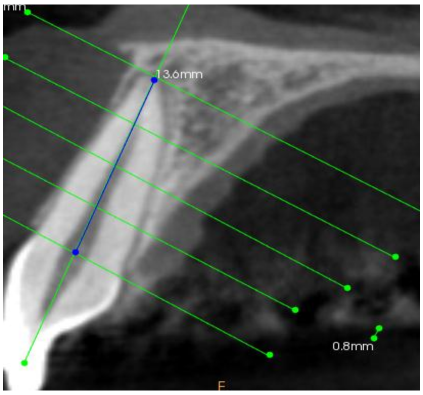


FIGURE 8 : Lingually inclined group(Group I)

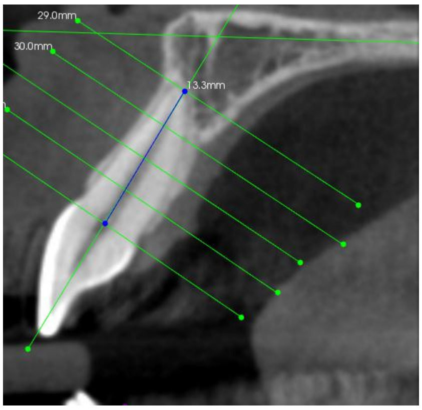


FIGURE 9 : Normally inclined group(Group II)

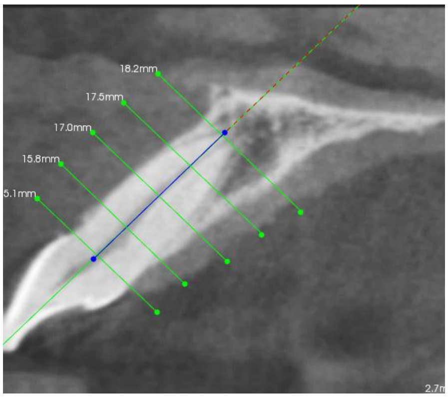


FIGURE 10 : Labially inclined group(Group III)

Colour Plate 5

MEASUREMENT OF LABIAL AND LINGUAL THICKNESS.

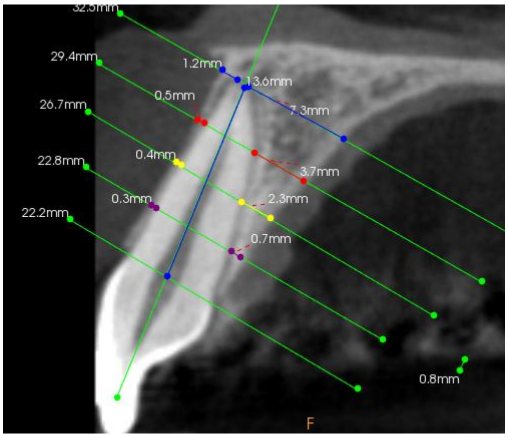


FIGURE 11: Lingually inclined group(Group I)

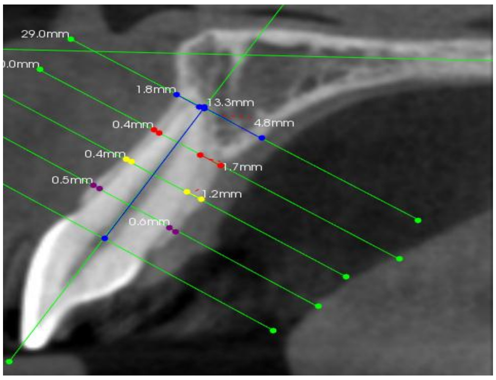


FIGURE 12: Normally inclined group(Group II)

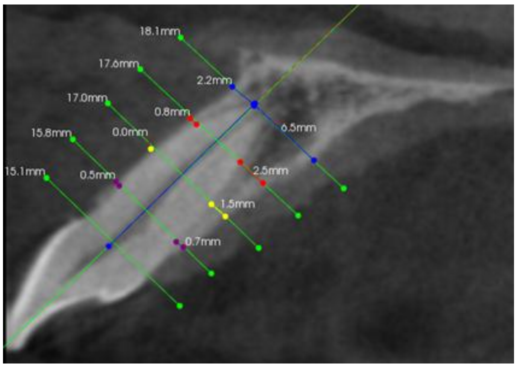


FIGURE 13: Labially inclined group(Group III)

Colour Plate 6

MEASUREMENT OF GRAY SCALE VALUES

FIGURE 14 : Gray scale values on the labial side.(Gray Scale value-1751)

FIGURE 15 : Gray scale values on the lingual side.(Gray Scale value-584)

Colour Plate 7

EVALUATION OF ALVEOLAR BONE DEFECTS

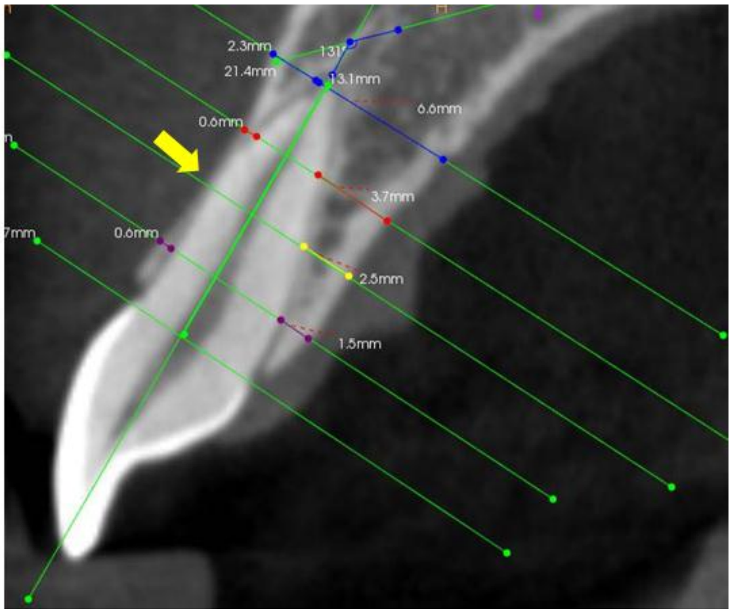


FIGURE 16 : Fenestration

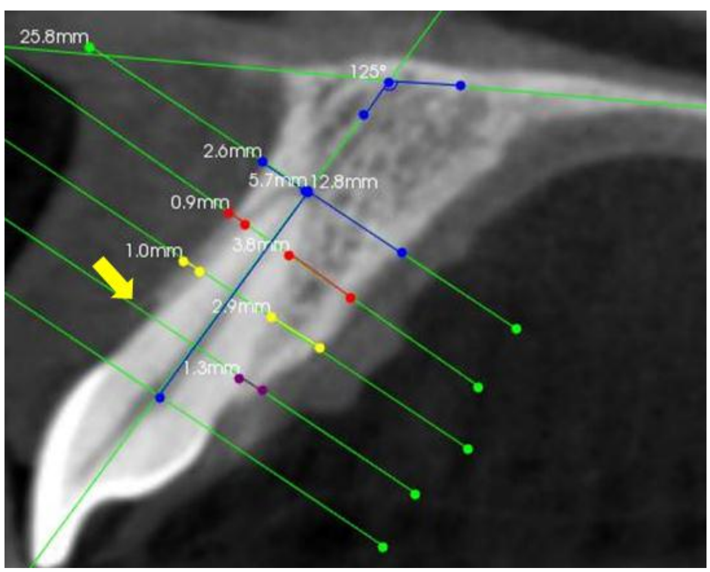


FIGURE 17 : Dehiscence

DISCUSSION

The anterior teeth occupy the most esthetically important zone of our face. They are the teeth which are commonly visible during eating, speech, mastication and most importantly while smiling. The maxillary central incisors occupy a strategic anatomical location in the front and in the centre of the upper arch, making them a dominating factor in influencing esthetics of our face.[4]

The factors influencing the characteristics of facial esthetics, related to the maxillary central incisors are its size, shape, colour and angle of inclination. The angle of inclination is the key factor in deciding the position of the upper central incisor (labial or lingually) and is considered to have a notable significance in supporting the upper lip.[5] The central incisors are the teeth which are subjected to either tipping or torqueing orthodontic forces for prolonged durations, during the orthodontic treatment to achieve the required esthetics.[48,49]

The amount of tooth movement allowed is directly proportional to the available thickness of alveolar bone.[2, 14] The alveolar bone thickness varies from patient to patient, tooth to tooth and depends upon the root size, root length, vertical facial height and the inclination of roots inside the alveolar bone.[3] Previous studies have shown that the bone support for anterior teeth of maxilla and mandible is very less as compared to premolars and molars. Moreover the thickness of labial bone present around the anterior teeth is very less in comparison to the lingual or palatal bone thickness. [12,35,39]

Orthodontic treatment directed at correcting the inclination of incisors in such limited boundaries of thin alveolar bone can be challenging. Sometimes movement of teeth during orthodontic treatment may cause denudation of bone around the root surface contacting the bone, thereby creating a periodontal defect leading to root exposure. Studies have also shown evidences of increase in the severities, of previously present defects causing further iatrogenic damage and leading to failure of orthodontic treatment.[6]

Sarikaya S et al. in their study have shown strong evidence that, the teeth with thin alveolar bone around them, tend to develop periodontal bone defects such as fenestration and dehiscence in the direction of tooth movement. Their study highlighted two facts, that there is no evidence of re-establishment of new cortical bone at these periodontally damaged sites and that such changes are so minute that they cannot be evaluated clinically nor on 2 D radiographic modalities like lateral cephalograms and suggested use of 3 D modilities like CT or CBCT as best suitable options.[6]

Bone density is an important parameter for orthodontic tooth movement. Thin alveolar bone is the main reason responsible for a lesser bone density around the anterior teeth. Studies have shown that the rate of tooth movement is inversely proportional to the amount of bone density surrounding the tooth.[36] **Tian YL et al** in their study suggested that thickness of alveolar bone on labial and lingual sides depends upon the angle of inclination of central incisor.[2]

Therefore before initiating orthodontic treatment thorough awareness about the angulation, thickness, and density of the bone surrounding the maxillary central incisors is necessary. Taking into account these factors present study was an attempt to understand the variation in alveolar bone thickness and the alveolar bone densities across differently inclined maxillary central incisors.

Earlier alveolar bone studies were done using cadaver head sections or by using 2 dimentional (2-D) radiographical modalities like as lateral cephalograms, IOPA and OPG's. The limitation of these 2D modalities was that sectional measurements was not possible and the overlapping of anatomical structures caused loss of information leading to inaccurate measurements. Recent studies have highlighted the significance of CBCT being an accurate and reliable tool for measuring the alveolar bone thickness.[50] **Ganguly R et al.** in their study have showed that the values measured on CBCT are not affected by overlying gingiva or soft tissue mucosa and the measurements made using CBCT are equivalent to the direct measurements made using Vernier calliper.[51]

Several methods have been employed for the measurement of the alveolar bone density such as digital image analysis of microradiographs, ultrasound and dual energy X-ray absorptiometry (DEXA) of which DEXA is considered to be the gold standard. DEXA being a costly procedure, is not routinely used while the digital image analysis of microradiographs and ultrasound pose limitations of providing information only in 2 Dimensional format.

Computed tomography (CT) is the most useful and widely used imaging techniques for providing information about the structure and the density of the body tissues. The bone density in CT is measured in Hounsfield units (HU), they represent the attenuation coefficient of the respective tissue. However, CT is not an acceptable approach for evaluating the alveolar bone density during orthodontic treatment due to its high radiation dosage and high cost. **Aranyarachkul P et al.** have demonstrated the importance of cone beam CT (CBCT) an alternative diagnostic method for measuring bone density with very less radiation dose as compared to CT. The radiation dose delivered to the patient during each scan is around 3 mGy for CT and 0.62 mGy for CBCT. Like the Hounsfield units (HU) in CT, the unit for measuring density in CBCT is the grayscale(GS) value.[10] **Lagravere MO et al.** have reported that there is a linear relationship between actual densities and the grayscale values obtained in a CBCT scan.[52]

Horizontal reference plane such as (palatal, occlusal, mandibular, Sella-Nasion, etc) are commonly taken into account for evaluating the inclination of maxillary central incisor. In this study the palatal plane was taken as a reference plane as it could be conveniently evaluated in the CBCT scans included in our study. Evaluation of other planes was not possible, as this study was a retrospective one and it included CBCT sections of anterior region only. Three groups were formed accordingly as- lingually inclined, normally inclined and labially inclined groups according to their inclination of central incisor with reference to the palatal plane with each group comprising of 50 CBCT scan sections. The lingually inclined group i.e. Group- I (U-PP≤110.1^{o}) comprised of 24 male and 26 female CBCT sections with mean age 25.54± 4.92, normally inclined group i.e. Group II (110.1^{o}-121.5^{o}) comprised of 25 male and 25 female CBCT sections with mean age 27.32± 4.22 and labially inclined group i.e. Group III (U-PP ≥ 121.5^{o}) comprised of 28 male and 22 female CBCT sections with mean age 26.04± 5.38. **(Table 1)** The average angle of inclination for the three groups were as follows: Group I- 105.83±4.66, Group II- 116.15±8.20 and Group III- 127.28 ± 3.85. **(Table 2)**

The root length was obtained by measuring the distance from the CEJ to the root apex. The average root length for each group was 12.71±2.25, 14.02±7.89, and 13.92±7.21 for Group I, Group II and Group III respectively. The differences between the average root lengths of the central incisor across all the three study groups were non-significant.**(Table 3)** When the root length was compared for gender difference here also no statistically significance was found. **Kim SY et al.** conducted a study in which they measured crown and root lengths of various teeth in 62 Korean patients using CBCT, their study showed that mean central incisor root length was 12.30±1.55 in males and 11.75±1.46 in females, suggesting that maxillary central incisor root length to be higher in males compared to females.[53]

The thickness of alveolar bone was measured at the labial and at lingual surfaces of the tooth. The root length i.e from the CEJ to tip of apex was calculated and was divided into equal 5 levels:

1. Level 1 (at the root apex)
2. level 2 (between of level 1 & level 3)
3. Level 3 (at the middle of root)
4. Level 4 (between level 3 and level 4)
5. Level 5 (CEJ)

The results of our study showed that the difference in labial thickness of alveolar bone amongst the three groups was statistically significant at level 1 and level 2 with p-values of 0.0029 and 0.0050 respectively. No statistical significance was noted at level 3, 4 and 5. The numerical data suggested presence of very thin alveolar bone over the labial surface in all the three groups. **Kalbassi S et al.** evaluated the buccal bone thickness for each tooth using CBCT and found that the buccal bone thickness was greater in posteriors than the anterior teeth. The least buccal bone thickness was obtained at the incisor and canine region, premolars region showed significantly greater buccal bone thickness than incisor and canine region while molars had the thickest buccal bone amongst all teeth.[13]

In the present study Level 1 and level 2 showed greatest alveolar bone thickness compared to the other levels. The average labial thickness was below 1 mm at levels 3, 4 and 5 respectively. When labial bone thickness was observed at level 2 it was seen that only Group 3 showed average values of more than 1mm (1.16 ± 1.04). Whereas at level 5, a maximum thickness of alveolar bone was noted in group III (2.74 ± 1.47) followed by Group II (2.24 ± 0.92) and Group I(1.95 ± 0.97) respectively. The results also suggested that Group I seemed to have a least amount of labial bone thickness at all levels as compared with the other two groups. Group III showed highest values of alveolar bone thickness at all levels in comparison with Group I and Group II. **(Table 4)**

In males the results of this study showed that the average labial bone thickness was significantly higher at all levels in group III, and a statistically significant difference was obtained at level 2 in males, while no significant difference was noted in the labial bone thickness values amongst group I and Group II. In male the labial thickness followed the same pattern with greatest thickness present at level 1 and least thickness at level 4. **(Table 4b)**

In females too, the thickness of alveolar bone on labial aspect was found to be greatest in group III at all levels but statistically significant thickness was noted at level 4 with mean average alveolar bone thickness value to be highest for group III, and no statistically significant difference between Group I and Group II.**(Table 4b)** Comparison of male and female mean labial bone thickness showed no siginificant difference at most levels except at Group III level 2 where a statistically significant mean for males (1.43±1.23) and (0.82±0.59) for females was noted.**(Table 4c)**

These labial bone thickness values were in accordance with the findings of **Kalbassi S et al.** who in their studies measured number of sites showing less than 0.1 mm for each tooth and found that maximum no of such sites with < 0.1 mm alveolar bone were seen with the incisors and canine suggesting a thinnest alveolar bone overlying these teeth.[13] **Shen J W et al.** also reported a very thin facial bone thickness over maxillary central incisor to be ranging from 0.5 -1.5 mm.[54] **Dayoub NS et al.** evaluated supporting bone thickness around 68 upper central incisor teeth, the results of their study suggested that the greatest amount of alveolar bone thickness was present at the apical region while least thickness being present at the cervical region, with no significant difference between the right and left central incisor.[7]

The results of this study showed that lingually inclined (Group I) teeth had the thinnest labial alveolar bone. This finding suggests that such teeth are more susceptible for developing iatrogenic damages such as fenestrations and dehiscence during orthodontic movements as compared to group II and group III teeth. It is therefore suggested to use light orthodontic forces for longer durations of time so that the alveolar bone may have sufficient time to remodel thus preventing development of periodontal problems.

On the lingual aspect the alveolar bone thickness was found to be highest in Group I teeth at all 5 levels compared with Group II and Group III teeth. The thickness of alveolar bone gradually increased from the coronal to the apical level with greatest thickness noted at level 1 and level 2 of all groups and minimum thickness present over the cervical levels. **(Table 5)**

The average lingual bone thickness value was very high in comparison with the labial thickness values of same level. The lingual bone thickness increases gradually from the CEJ to the root apex level. Greatest thickness was obtained at level 1 and level 2 where the difference of the mean across the groups was highly significant (p value < 0.0001), while at level 3 the difference of mean across the groups was statistically only significant (p value 0.0288). Level 4 and 5 showed no statistically significant results across the groups.

Group I showed greatest alveolar bone thickness at all levels as compared to other groups. Least thickness was obtained in group III across all the levels in comparison to group I and group II. This finding suggests that the thickest alveolar bone is present in lingually inclined teeth compared with normally inclined teeth and labially inclined teeth.

Similar results were obtained in a study by **Sadek M M et al.** in which they divided teeth on the basis of vertical skeletal pattern into high angle group (labially inclined), low angle group (lingually inclined) and normal angle group and the alveolar bone thickness were measured. The results of their study suggested that high angle group(labially inclined), had thinner alveolar bone as compared to low angle group (lingually inclined), this finding was in accordance with the results obtained in our study.[39]

Nahm KY et al. in their study also found that, thin and insufficient bone covers the labial surfaces of incisors with alveolar bone thickness less than 2 mm up to apex of central incisors while on the lingual aspect the alveolar bone thickness was relatively high. They also suggested the alveolar bone thickness increases in the direction of root apex with minimum thickness found at CEJ level and maximum thickness toward the root apex.[31] **Lee SL et al.** also found that very thin alveolar bone was present over the labial aspect of teeth with values less than 1 mm, in contrary to the palatal aspect where the alveolar bone thickness was comparatively higher.[25]

In males differences of mean values of average lingual thickness were significantly different across three groups were seen at root level 1 and 2, the as revealed by p-values of 0.0179 and 0.0012 respectively. Pairwise analysis suggested that the mean value in group I was significantly higher than group III; however, group II showed insignificant difference from that of group I and III. For remaining root levels, the difference of mean lingual thickness between three study groups was statistically insignificant as indicated by p-values greater than 0.05.**(Table 5a)**

In females greatest values of alveolar bone thickness on lingual aspect were obtained at level 1 and level 2, also in these levels the difference of mean values across the three groups was highly statistically significant with p-value < 0.0001. Level 1 and 2 values of Group 1 were the highest in comparison to level 1 and level 2 values of Group II and Group III. Suggesting lingual alveolar bone to be thickest at the apical end of lingually inclined teeth.**(Table 5b)**

On comparing lingual alveolar bone thickness between the genders, males showed greater mean alveolar thickness value compared to females at all 5 levels and across all the three groups. **(Table 5c)** This finding was in accordance with the study done by **Alsaffar ZJ et al, Braun S et al and Usui T et al** in which they found that labial and lingual bone thickness was greater in males than in females. The reason they suggested for thicker alveolar bone amongst males than in females could be attributed to the fact that men have heavier biting forces and a stronger masticatory muscles than females. [55, 56, 57] Study conducted by **Dayob NS and Al-Sabbagh R** showed no significant difference in alveolar bone thickness in labial or lingual aspect between male and females.[7] These findings are contrary and could be due to the difference in the gender comparison could be due a difference in sample size and difference in population evaluated in their study.

The ample amount of bone support over the lingual aspect suggests that it safe to carry out lingual tooth movements. Group wise comparison showed that Group III had the least lingual bone thickness compared to Group I and Group II, therefore it is suggested to avoid major orthodontic tooth movements on the lingual aspect in labially inclined teeth.

Density is another important parameter on which the rate of tooth movement during orthodontic treatment depends. The rate of tooth movement is inversely proportional to the density of surrounding bone.[36] **Hsu JT et al.** evaluated the bone density changes around teeth during orthodontic treatment and found that greatest reduction in bone density was seen for alveolar bone surrounding maxillary central incisor. They also suggested that the reason for such density loss could be due the excessive movement and prolonged treatment the central incisors undergo.[11] In this study the evaluation of bone density was done by comparing average gray scale value across all the three groups.

On the labial aspect highest gray scale values were obtained at level 1 and level 2 across all the three groups with statistically significant results (p-values 0.0354 and 0.0002). Such high Gray scale values at the apical level could be correlated with presence of relatively thicker alveolar bone at level 1 and level 2. **(Table 4)** This finding correlates well with the fact that, thicker the alveolar bone over the labial aspect higher is the bone density. Tukey’s post-hoc test revealed that the mean value of average gray scale was significantly lower in group I as compared to group II and III. The difference of means between group II and III were statistically not significant. The difference amongst gray values could be attributed to the thin alveolar bone levels obtained in Group I inclined teeth in comparison other two groups which had a comparatively higher bone thickness therefore greater bone density or Gray values. **(Table 6)**

In males also highest mean Gray scale values were obtained at level 1 and 2 labially. Showing correlation with the thicker alveolar bone at the apical level. **(Table 4a)** The labial Gray scale difference was statistically significant at root level 2. With significantly lowest values obtained with group I inclined teeth in comparison to Group II and Group III. **(Table 6a) S**uggesting that the lingually inclined teeth have a low bone density on the labial aspect in comparison to normally and labially inclined teeth. Amongst females statistically significant gray scale values were obtained only at level 2 with P- value 0.0259**(Table 6b)**

Amongst males and females In group II at level 4, the difference of means between males (826.32 ± 322.71) and females (1052.58 ± 311.13) was statistically significant with p-value 0.015. All other comparisons in each group and at different levels were not significant. **(Table 6c)**

On comparing average gray scale values on the lingual aspect it was found that less mean gray scale values at level 1 and 2 where maximum alveolar bone thickness was obtained. Suggesting the fact that thicker the alveolar bone on lingual aspect lesser is the bone density. This finding was in contrast to the correlation we obtained at the labial aspect. The reason for obtaining such difference of densities at labial and lingual sides of a tooth could be due to difference in the distribution of cancellous bone. Cancellous bone is less dense as compared to the cortical bone, the presence of more amount of cancellous bone on the lingual aspect may account for it being lesser dense even in regions having thick alveolar bone. The average gray scale values were lowest at the apical end or level 1 and gradually increased cervically with highest gray values being at level 4 across all the three groups. **(Table 7)**

Average gray scale values in males did not show statistically significant differences across three study groups. (**Table 7a)** Whereas in females, the average gray scale values were statistically significant across different groups at root level 2. The mean average gray scale value was significantly lower in group I (909.10 ± 376.81) as compared to group III (1207.18 ± 369.62), while group II (992.80 ± 319.48) showed statistically insignificant difference with that of group I and III.**(Table 7b)**

Comparison of mean gray scale values between genders suggested that females had higher gray scale values across all the three groups and also at every level as compared with males. **(Table 7c)**

The thin alveolar bone in the anterior maxillary region harbour certain periodontal insufficiencies or defects which are to be taken into account while planning orthodontic treatment. Two of such commonly encountered defects are fenestrations and dehiscence. Dehiscence denotes the lack of facial or lingual cortical plate from the alveolar bone margin while fenestration is localized defect in alveolar bone exposing the underlying root surface but it does not involve the margin.[40] In the present study frequency of fenestrations was seen in 12 (24%) individuals in group I, 10 (20%) in group II and 6 (12%) in group III respectively. This data suggested that lingually inclined teeth have more incidence of fenestrations and the labially inclined groups had almost 50% less fenestrations correlating the thin alveolar thickness of bone obtained in our study in lingually inclined group although no significant difference was obtained across the groups with p-value 0.2924. **(Table 8)** This was in accordance with the study by **Tian YL et al.** in which they assessed alveolar bone thickness around differently inclined central incisors using CBCT and found that fenestrations were more prevalent in lingually inclined maxillary central incisors.[2]

This finding suggests that lingually inclined teeth are more susceptible for having pre-existing alveolar defects of fenestrations and there are high chances of these defects getting worse, if inadvertent orthodontic forces are used to move the teeth in labial direction. It is therefore advised that such defects must be evaluated prior to orthodontic treatment with the use of low grade orthodontic forces for long durations which will help body to adapt to these changes thus preventing the iatrogenic damages.

Males showed greater number of fenestrations in lingually inclined group, while least number of fenestration were seen in normally inclined group amongst males.**(Table 8a)**

In females the maximum no of fenestration were seen in group II and least no of fenestration in the group III. **(Table 8b)**

Gender wise distribution suggested that in group II, the proportion of females with positive fenestration was significantly higher than that of males. In other two groups, the distribution of cases with fenestration was not significantly different.**(Table 8c)**

Highest prevalence of dehiscence was seen in the lingually inclined Group (8%) while Group I and Group II showed only 4% of teeth associated with dehiscence. (**Table 9)**

Maximum incidence of dehiscence across males was seen in labially inclined group and across females it was seen with same percentage of occurrence in Group II and Group III, the females in Group I did not show any evidence of dehiscence **(Table 9a & 9b)**

Genderwise distribution of dehiscence did not show any statistically signicicant difference across any of the three groups **(Table 9c)** The present study showed very less percentages of prevalence of fenestration and dehiscence as compared to the studies done by **Nimigean VR et al, Larato DC and Abdelmalek RG et al.**[3, 16, 17] This variation could be due the fact that in the study only one tooth i.e maxillary central incisor was evaluated while other studies involved evaluation of entire teeth in the arch.

CONCLUSION

This retrospective observational study involved evaluation of labial and lingual bone thickness and density around 150 incisor teeth which were divided into three groups on the basis of palatal plane and central incisor inclination. The conclusion which can be drawn from our study is that:

1. A relatively thin supporting alveolar bone is present surrounding the maxillary central incisor with the thinnest being over the labial surface in comparison to the lingual surface.

2. The CEJ region showed the presence of thinnest alveolar bone and the thickness gradually increased towards the apex, with the greatest amount of bone thickness at the apical level of roots on both labial and lingual sides.

3. The effect of inclination on the thickness of supporting bone was as follows:

i. Lingually inclined teeth had the thinnest alveolar bone on the labial aspect at all levels, as compared to normally and labially inclined group.

ii. Normally inclined group had a moderate amount of alveolar bone thickness at all levels, in comparison to the lingually and labially inclined groups.

iii. Labially inclined group had a greatest alveolar bone thickness on the labial aspect at all levels in comparison to lingually and normally inclined groups.

iv. Lingially inclined teeth had least amount of alveolar bone thickness (labially) at the root apex (1.95±0.97) in comparison to normally inclined group (2.24±0.92) and labially inclined group (2.74±1.47), suggesting its close proximity to the alveolar bone plate.

v. Lingually inclined group had the greatest alveolar bone thickness(lingually) at all levels as compared to normally inclined and labially inclined groups.

vi. At the apex the labially inclined group had the least thickness of alveolar bone on the lingual aspect (6.20±1.87) in comparison to normally inclined groups(7.28±2.00) and lingually inclined group (8.49±2.83) .

4. The bone density values on the labial aspect, increased proportionally as the alveolar thickness increased apically across all the three groups.

5. The bone density values on the lingual aspect, decreased proportionally as the alveolar thickness increased apically across all the three groups.

6. Maximum numbers of fenestrations were seen in the lingually inclined group (29.17 %) owing to the close proximity of its root apex to the cortical bone plate.

7. Least fenestrations were present in the labially tilted teeth (2%).

8. Dehiscence obtained were lesser in comparison to the fenestration and was seen mostly occurring in the labially inclined group (4%)

FUTURE STUDIES

A prospective observational study should be done on patients undergoing orthodontic treatment which will provide more useful information on the thickness, density and periodontal defects both before and after completion of the orthodontic treatment.

LIMITATIONS

1. Use of Hounsfield units instead of gray values would have enabled to classify bone densities accordingly.

2. A larger sample size would provide a more precise data regarding alveolar bone thickness.

3. Observer bias should have been removed by including more observers in the study.

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Table 1: Comparison of demographic profile of individuals across three study groups.

Characteristics	Group I	Group II	Group III	P-value
Age in years [Mean ± SD]	25.54 ± 4.92	27.32 ± 4.22	26.04 ± 5.38	0.1718 (NS)*
Gender [No. (%)]				
Male	24 (48)	25 (50)	28 (56)	0.7069 (NS)†
Female	26 (52)	25 (50)	22 (44)	

*Obtained using *one-way ANOVA test*; †Obtained using *Chi-square test;* NS*: Non-Significant*

Table 2: Comparison of average angle of inclination according to gender across each study groups.

Average angle of inclination (^{o})	Group I	Group II	Group III	P-value*
Male	105.40 ± 5.55[a]	114.72 ± 11.42[b]	127.82 ± 4.08[c]	< 0.0001 (HS)
Female	106.23 ± 3.73[a]	117.58 ± 1.66[b]	126.64 ± 3.59[c]	< 0.0001 (HS)
Overall	105.83 ± 4.66[a]	116.15 ± 8.20[b]	127.28 ± 3.85[c]	< 0.0001 (HS)

*Obtained using *one-way ANOVA test;* HS*: Highly Significant; Means with different superscript shows statistical significance*

Table 3: Comparison of average root length according to gender in each study group.

Average Root length (mm)	Group I	Group II	Group III	P-value*
Male	13.05 ± 1.30	13.17 ± 0.99	13.57 ± 1.45	0.2999 (NS)
Female	12.40 ± 2.85	14.87 ± 11.17	14.36 ± 10.94	0.5912 (NS)
Overall	12.71 ± 2.25	14.02 ± 7.89	13.92 ± 7.21	0.5162 (NS)

*Obtained using *one-way ANOVA test;* NS*: Non-Significant*

Table 4: Comparison of average labial bone thickness across three study groups at different root levels.

Level	Average Labial Thickness (mm) [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	1.95 ± 0.97[ab]	2.24 ± 0.92[b]	2.74 ± 1.47[bc]	0.0029 (S)
2	0.69 ± 0.68[a]	0.78 ± 0.41[a]	1.16 ± 1.04[b]	0.0050 (S)
3	0.56 ± 0.33	0.58 ± 0.56	0.70 ± 0.51	0.2891 (NS)
4	0.68 ± 0.33	0.71 ± 0.69	0.82 ± 0.77	0.4828 (NS)
5	0.01 ± 0.07	0.00 ± 0.00	0.00 ± 0.00	0.3704 (NS)

*Obtained using one-way ANOVA test; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 4a: Comparison of mean labial bone thickness in males across three study groups at different root levels.

Level	Mean Labial Thickness (mm) [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	1.81 ± 0.72[ab]	2.45 ± 0.97[b]	2.89 ± 1.71[bc]	0.0097 (S)
2	0.59 ± 0.39[a]	0.85 ± 0.32[a]	1.43 ± 1.23[b]	0.0009 (S)
3	0.57 ± 0.29	0.65 ± 0.22	0.79 ± 0.50	0.0986 (NS)
4	0.77 ± 0.23	0.75 ± 0.95	0.64 ± 0.49	0.7403 (NS)
5	0 ± 0	0 ± 0	0 ± 0	-

*Obtained using one-way ANOVA test; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 4b: Comparison of mean labial bone thickness in females across three study groups at different root levels.

Level	Mean Labial Thickness (mm) [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	2.08 ± 1.15	2.03 ± 0.83	2.55 ± 1.10	0.1800 (NS)
2	0.78 ± 0.87	0.71 ± 0.49	0.82 ± 0.59	0.8603 (NS)
3	0.55 ± 0.38	0.52 ± 0.77	0.59 ± 0.50	0.9095 (NS)
4	0.59 ± 0.38^{ab}	0.67 ± 0.27^{b}	1.05 ± 1.00^{bc}	0.0303 (S)
5	0.02 ± 0.10	0.00 ± 0.00	0.00 ± 0.00	0.4107 (NS)

*Obtained using one-way ANOVA test; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 4c: Comparison of mean labial bone thickness gender wise at each level in three study groups.

Level	Gender	Mean Labial Thickness (mm) [Mean ± SD]		
		Group I	Group II	Group III
1	Male	1.81 ± 0.72	2.45 ± 0.97	2.89 ± 1.71
	Female	2.08 ± 1.15	2.03 ± 0.83	2.55 ± 1.10
	P-value*	0.3294	0.1065	0.4223
2	Male	0.59 ± 0.39	0.85 ± 0.32	1.43 ± 1.23
	Female	0.78 ± 0.87	0.71 ± 0.49	0.82 ± 0.59
	P-value*	0.3310	0.2375	**0.0377**
3	Male	0.57 ± 0.29	0.65 ± 0.22	0.79 ± 0.50
	Female	0.55 ± 0.38	0.52 ± 0.77	0.59 ± 0.50
	P-value*	0.8362	0.4210	0.1668
4	Male	0.77 ± 0.23	0.75 ± 0.95	0.64 ± 0.49
	Female	0.59 ± 0.38	0.67 ± 0.27	1.05 ± 1.00
	P-value*	0.0506	0.6873	0.0632
5	Male	0 ± 0	0 ± 0	0 ± 0
	Female	0.02 ± 0.10	0.00 ± 0.00	0.00 ± 0.00
	P-value*	0.3325	-	-

*Obtained using t-test for independent samples

Table 5: Comparison of average lingual bone thickness of all individuals across three study groups at different root levels.

Level	Average Lingual Thickness (mm) [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	8.49 ± 2.83[a]	7.28 ± 2.00[b]	6.20 ± 1.87[b]	< 0.0001 (HS)
2	5.19 ± 1.93[a]	4.42 ± 1.56[a]	3.52 ± 1.46[b]	< 0.0001 (HS)
3	3.34 ± 1.43[ab]	2.92 ± 1.21[b]	2.52 ± 1.83[bc]	0.0288 (S)
4	1.67 ± 0.83	1.36 ± 0.74	1.44 ± 1.01	0.1850 (NS)
5	0.06 ± 0.34	0.01 ± 0.06	0.00 ± 0.00	0.2920 (NS)

*Obtained using one-way ANOVA test; HS: Highly Significant; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 5a: Comparison of mean lingual bone thickness in males across three study groups at different root levels.

Level	Mean Lingual Thickness (mm) [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	8.95 ± 2.76[ab]	8.20 ± 2.24[b]	7.11 ± 1.87[bc]	0.0179 (S)
2	5.97 ± 2.04[ab]	5.15 ± 1.67[b]	4.11 ± 1.55[bc]	0.0012 (S)
3	3.86 ± 1.64	3.31 ± 1.28	2.96 ± 2.25	0.2032 (NS)
4	1.97 ± 0.94	1.56 ± 0.85	1.57 ± 1.26	0.2885 (NS)
5	0.10 ± 0.48	0 ± 0	0 ± 0	0.3272 (NS)

*Obtained using one-way ANOVA test; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 5b: Comparison of mean lingual bone thickness in females across three study group at different root levels.

Level	Mean Lingual Thickness (mm) [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	8.08 ± 2.88[a]	6.36 ± 1.17[b]	5.05 ± 1.09[b]	< 0.0001 (HS)
2	4.48 ± 1.53[a]	3.69 ± 1.04[a]	2.77 ± 0.92[b]	< 0.0001 (HS)
3	2.85 ± 1.00[ab]	2.53 ± 1.00[b]	1.95 ± 0.84[bc]	0.0074 (S)
4	1.39 ± 0.60	1.16 ± 0.56	1.27 ± 0.55	0.3659 (NS)
5	0.02 ± 0.11	0.02 ± 0.09	0 ± 0	0.6488 (NS)

*Obtained using *one-way ANOVA test;* S*: Significant;* NS*: Non-Significant; Means with different superscript shows statistical significance*

Table 5c: Comparison of mean lingual bone thickness gender wise at each level in three study groups.

Level	Gender	Mean Lingual Thickness (mm) [Mean ± SD]		
		Group I	Group II	Group III
1	Male	8.95 ± 2.76	8.20 ± 2.24	7.11 ± 1.87
	Female	8.08 ± 2.88	6.36 ± 1.17	5.05 ± 1.09
	P-value*	0.2817	**0.0007**	**0.0001**
2	Male	5.97 ± 2.04	5.15 ± 1.67	4.11 ± 1.55
	Female	4.48 ± 1.53	3.69 ± 1.04	2.77 ± 0.92
	P-value*	**0.0051**	**0.0005**	**0.0008**
3	Male	3.86 ± 1.64	3.31 ± 1.28	2.96 ± 2.25
	Female	2.85 ± 1.00	2.53 ± 1.00	1.95 ± 0.84
	P-value*	**0.0108**	**0.0203**	0.0517
4	Male	1.97 ± 0.94	1.56 ± 0.85	1.57 ± 1.26
	Female	1.39 ± 0.60	1.16 ± 0.56	1.27 ± 0.55
	P-value*	**0.0117**	0.0552	0.3036
5	Male	0.10 ± 0.48	0 ± 0	0 ± 0
	Female	0.02 ± 0.11	0.02 ± 0.09	0 ± 0
	P-value*	0.4122	0.2721	-

Table 6: Comparison of average gray scale values of all individuals across three study groups at different root levels - Labial side.

Level	Average Gray Scale value [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	1155.37 ± 440.36[a]	1338.79 ± 410.41[b]	1335.20 ± 347.10[b]	0.0354 (S)
2	890.31 ± 569.10[a]	1169.90 ± 466.01[b]	1283.76 ± 369.39[b]	0.0002 (S)
3	916.08 ± 498.74	937.55 ± 502.61	1003.26 ± 559.58	0.6846 (NS)
4	991.65 ± 409.46	939.45 ± 333.88	1012.38 ± 474.45	0.6578 (NS)
5	17.07 ± 120.70	7.54 ± 53.32	0.00 ± 0.00	0.5338 (NS)

*Obtained using one-way ANOVA test; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 6a: Comparison of mean gray scale values in males across three study groups at different root levels - Labial side.

Level	Mean Gray Scale value [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	1221.90 ± 369.05	1297.18 ± 341.26	1339.32 ± 354.65	0.4916 (NS)
2	944.42 ± 555.77[ab]	1175.96 ± 410.11[b]	1319.39 ± 251.03[bc]	0.0072 (S)
3	917.40 ± 482.27	1011.76 ± 283.87	1071.11 ± 481.27	0.4355 (NS)
4	1093.00 ± 341.09	826.32 ± 322.71	930.57 ± 479.41	0.0629 (NS)
5	0 ± 0	0 ± 0	0 ± 0	-

*Obtained using *one-way ANOVA test;* S*: Significant;* NS*: Non-Significant*; *Means with different superscript shows statistical significance*

Table 6b: Comparison of mean gray scale values in females across three study groups at different root levels - Labial side.

Level	Mean Gray Scale value [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	1093.96 ± 496.59	1380.40 ± 473.09	1329.95 ± 345.49	0.0585 (NS)
2	840.37 ± 587.55[ab]	1163.84 ± 524.52[b]	1238.41 ± 483.23[bc]	0.0259 (S)
3	914.87 ± 523.02	863.34 ± 650.93	916.91 ± 647.21	0.9405 (NS)
4	898.10 ± 450.13	1052.58 ± 311.13	1116.50 ± 457.66	0.1677 (NS)
5	32.83 ± 167.39	15.08 ± 75.40	0 ± 0	0.5840 (NS)

*Obtained using one-way ANOVA test; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 6c: Comparison of mean gray scale values gender wise at each level in three groups – Labial side

Level	Gender	Mean Gray Scale value [Mean ± SD]		
		Group I	Group II	Group III
1	Male	1221.90 ± 369.05	1297.18 ± 341.26	1339.32 ± 354.65
	Female	1093.96 ± 496.59	1380.40 ± 473.09	1329.95 ± 345.49
	P-value*	0.3096	0.4791	0.9257
2	Male	944.42 ± 555.77	1175.96 ± 410.11	1319.39 ± 251.03
	Female	840.37 ± 587.55	1163.84 ± 524.52	1238.41 ± 483.23
	P-value*	0.5239	0.9279	0.4473
3	Male	917.40 ± 482.27	1011.76 ± 283.87	1071.11 ± 481.27
	Female	914.87 ± 523.02	863.34 ± 650.93	916.91 ± 647.21
	P-value*	0.9859	0.3013	0.3386
4	Male	1093.00 ± 341.09	826.32 ± 322.71	930.57 ± 479.41
	Female	898.10 ± 450.13	1052.58 ± 311.13	1116.50 ± 457.66
	P-value*	0.0929	**0.0150**	0.1714
5	Male	0 ± 0	0 ± 0	0 ± 0
	Female	32.83 ± 167.39	15.08 ± 75.40	0 ± 0
	P-value*	0.3418	0.3223	-

Table 7: Comparison of average gray scale values of all individuals across three study groups at different root levels - Lingual side.

Level	Average Gray Scale value [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	665.25 ± 324.72	720.00 ± 265.71	658.66 ± 270.71	0.5071 (NS)
2	800.91 ± 312.25^{ab}	922.93 ± 355.52^{b}	1000.98 ± 370.43^{bc}	0.0165 (S)
3	1041.58 ± 452.89^{ab}	1163.69 ± 408.73^{b}	1252.96 ± 345.21^{bc}	0.0347 (S)
4	1259.31 ± 352.22	1292.86 ± 395.70	1317.92 ± 434.23	0.7589 (NS)
5	71.51 ± 298.65	0.00 ± 0.00	0.00 ± 0.00	0.0654 (NS)

*Obtained using one-way ANOVA test; S: Significant; NS: Non-Significant; Means with different superscript shows statistical significance

Table 7a: Comparison of mean gray scale values in males across three study groups at different root levels - Lingual side.

Level	Mean Gray Scale value [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	582.23 ± 317.68	694.66 ± 272.62	696.75 ± 296.63	0.3022 (NS)
2	683.71 ± 160.68	853.06 ± 381.86	838.96 ± 284.43	0.0835 (NS)
3	943.85 ± 444.58	1048.84 ± 382.39	1147.43 ± 289.30	0.1535 (NS)
4	1198.15 ± 318.85	1220.72 ± 446.46	1167.25 ± 501.79	0.9034 (NS)
5	97.50 ± 358.05	0.00 ± 0.00	0.00 ± 0.00	0.1638 (NS)

*Obtained using *one-way ANOVA test;* NS*: Non-Significant*

Table 7b: Comparison of mean gray scale values in females across three study groups at different root levels - Lingual side.

Level	Mean Gray Scale value [Mean ± SD]			P-value*
	Group I	Group II	Group III	
1	741.88 ± 317.96	745.34 ± 261.70	610.18 ± 231.23	0.1714 (NS)
2	909.10 ± 376.81[ab]	992.80 ± 319.48[b]	1207.18 ± 369.62[bc]	0.0164 (S)
3	1131.79 ± 450.05	1278.54 ± 409.12	1387.27 ± 369.73	0.1058 (NS)
4	1315.77 ± 377.79	1365.00 ± 330.93	1509.68 ± 217.80	0.1071 (NS)
5	46.56 ± 232.80	0.00 ± 0.00	0.00 ± 0.00	0.3962 (NS)

*Obtained using *one-way ANOVA test;* S*: Significant;* NS*: Non-Significant; Means with different superscript shows statistical significance*

Table 7c: Comparison of mean gray scale values gender wise at each level in three groups – Lingual side.

Level	Gender	Mean Gray Scale value [Mean ± SD]		
		Group I	Group II	Group III
1	Male	582.23 ± 317.68	694.66 ± 272.62	696.75 ± 296.63
	Female	741.88 ± 317.96	745.34 ± 261.70	610.18 ± 231.23
	P-value*	0.0823	0.5057	0.2660
2	Male	683.71 ± 160.68	853.06 ± 381.86	838.96 ± 284.43
	Female	909.10 ± 376.81	992.80 ± 319.48	1207.18 ± 369.62
	P-value*	**0.0093**	0.1669	**0.0002**
3	Male	943.85 ± 444.58	1048.84 ± 382.39	1147.43 ± 289.30
	Female	1131.79 ± 450.05	1278.54 ± 409.12	1387.27 ± 369.73
	P-value*	0.1444	**0.0458**	**0.0132**
4	Male	1198.15 ± 318.85	1220.72 ± 446.46	1167.25 ± 501.79
	Female	1315.77 ± 377.79	1365.00 ± 330.93	1509.68 ± 217.80
	P-value*	0.2420	0.2005	**0.0045**
5	Male	97.50 ± 358.05	0.00 ± 0.00	0.00 ± 0.00
	Female	46.56 ± 232.80	0.00 ± 0.00	0.00 ± 0.00
	P-value*	0.5507	-	-

Table 8: Comparison of the frequency of fenestrations across three study groups - Overall.

Fenestration	No. (%)			
	Group I (n=50)	Group II (n=50)	Group III (n=50)	P-value
Fenestration positive	12 (24)	10 (20)	6 (12)	0.2924 (NS)
Fenestration negative	38 (76)	40 (80)	44 (88)	

*Obtained using *Chi-square test*; NS: *Non-Significant*

Table 8a: Comparison of the frequency of fenestrations across three study groups - Males.

Fenestration	No. (%)			
	Group I (n=24)	Group II (n=25)	Group III (n=28)	P-value*
Fenestration positive	7 (29.17)	1 (4)	2 (7.14)	0.0166 (S)
Fenestration negative	17 (70.83)	24 (96)	26 (92.86)	

*Obtained using *Chi-square test*; S: *Significant*

Table 8b: Comparison of the frequency of fenestrations across three study groups - Females

Fenestration	No. (%)			
	Group I (n=26)	Group II (n=25)	Group III (n=22)	P-value*
Fenestration positive	5 (19.23)	9 (36)	4 (18.18)	0.2671 (NS)
Fenestration negative	21 (80.77)	16 (64)	18 (81.82)	

*Obtained using *Chi-square test*; NS: *Non-Significant*

Table 8c: Comparison of frequency of fenestrations across three study groups – Gender wise.

Fenestration	Gender	No. (%)		
		Group I	Group II	Group III
Fenestration positive	Male	7 (29.17)	1 (4)	2 (7.14)
	Female	5 (19.23)	9 (36)	4 (18.18)
	P-value*	0.6238	**0.0133**	0.9023

*Obtained using z-test for proportions

Table 9: Comparison of the frequency of dehiscence across three study groups – Overall.

Dehiscence	No. (%)			
	Group I (n=50)	Group II (n=50)	Group III (n=50)	P-value*
Yes	2 (4)	2 (4)	4 (8)	0.5897 (NS)
No	48 (96)	48 (96)	46 (92)	

*Obtained using *Chi-square test*; NS: *Non-Significant*

Table 9a: Comparison of the frequency of dehiscence across three study groups – Males.

Dehiscence	No. (%)			
	Group I (n=24)	Group II (n=25)	Group III (n=28)	P-value*
Yes	0	2 (8)	2 (7.14)	0.3809 (NS)
No	24 (100)	23 (92)	26 (92.86)	

*Obtained using *Chi-square test*; NS: *Non-Significant*

Table 9b: Comparison of the frequency of dehiscence across three study groups- Females.

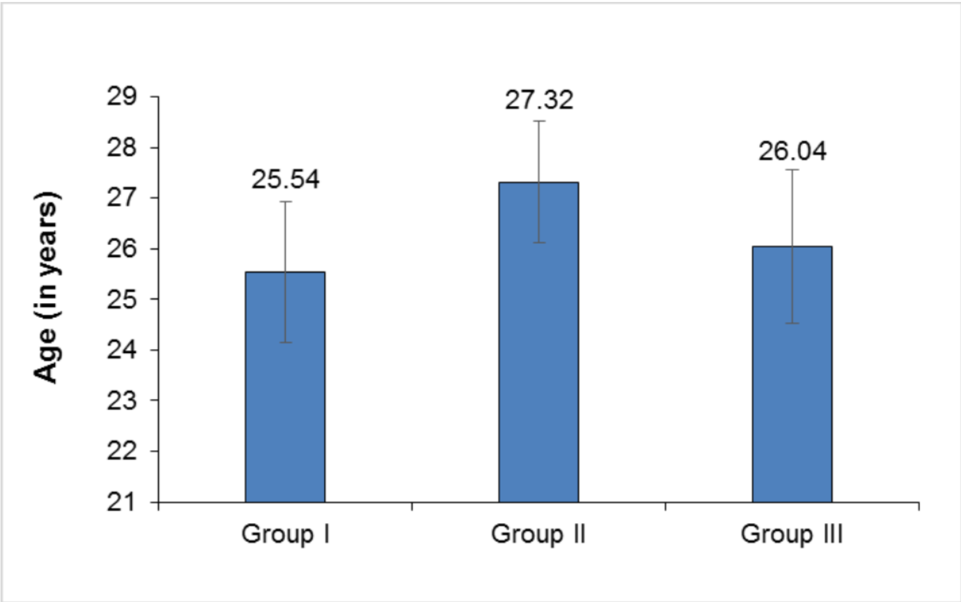
Dehiscence	No. (%)			
	Group I (n=26)	Group II (n=25)	Group III (n=22)	P-value*
Yes	2 (7.69)	0	2 (9.09)	0.3248 (NS)
No	24 (92.31)	25 (100)	20 (90.91)	

*Obtained using *Chi-square test*; NS: *Non-Significant*

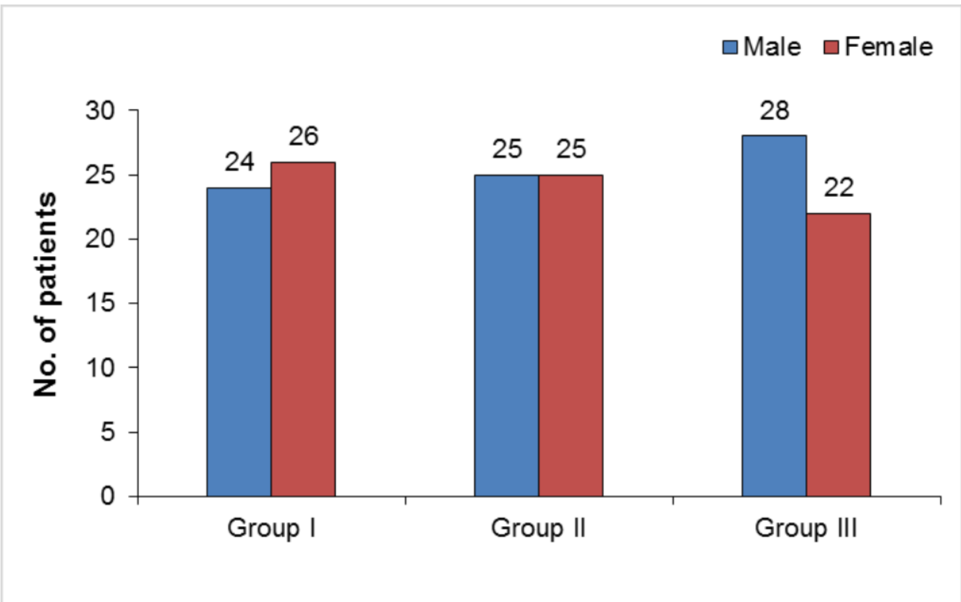
Table 9c: Comparison of frequency of dehiscence across three study groups – Gender wise.

Dehiscence	Gender	No. (%)		
		Group I	Group II	Group III
Yes	Male	0	2 (8)	2 (7.14)
	Female	2 (7.69)	0	2 (9.09)
	P-value*	0.5064	0.4705	0.999

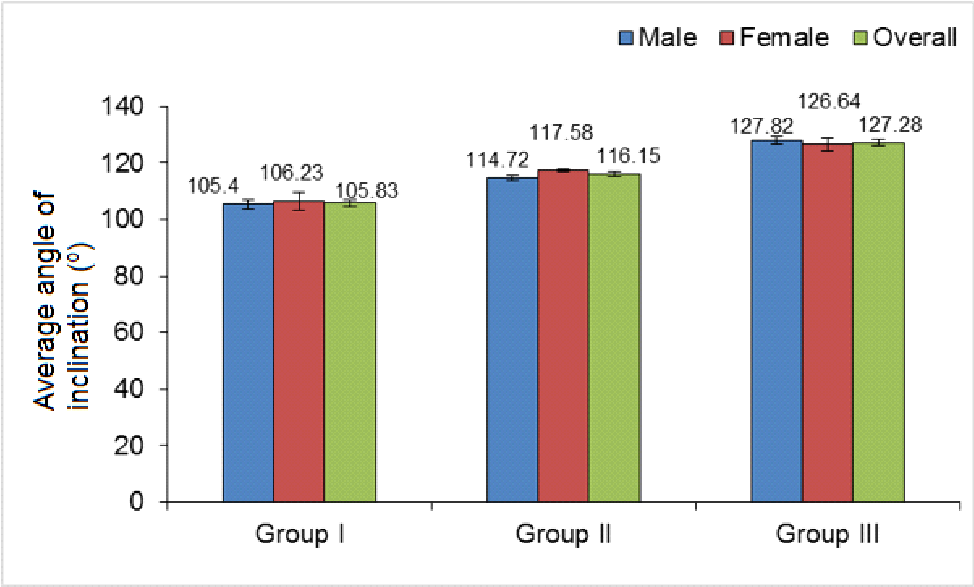
*Obtained using Z-test for proportions



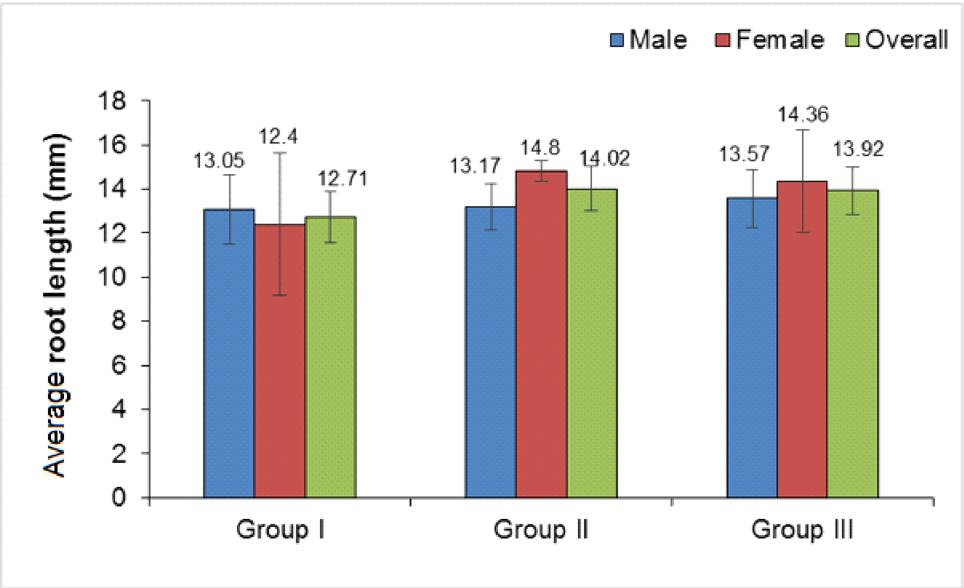
Graph 1: Column chart showing mean age of patients in three study groups.



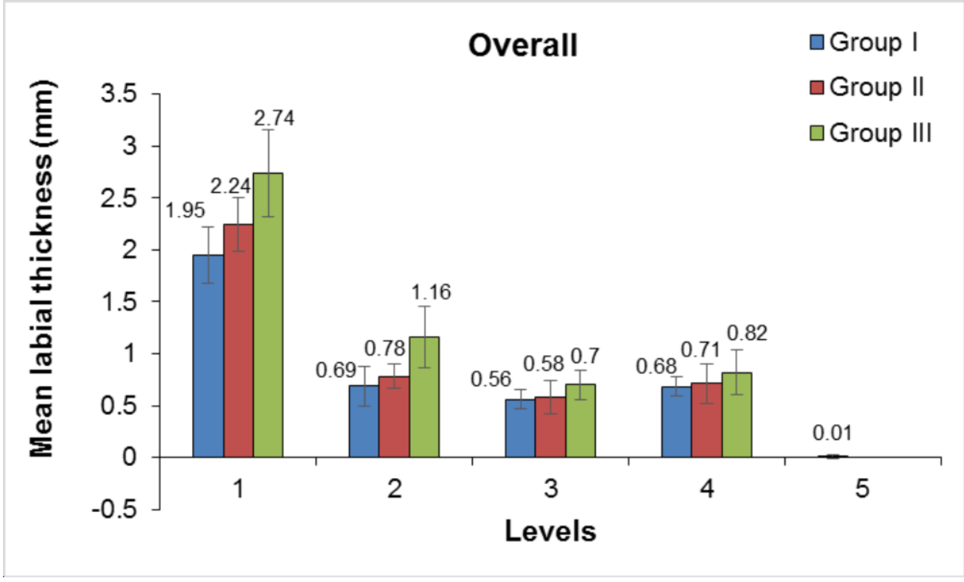
Graph 2: Column chart showing number of patients as per gender across each study group.



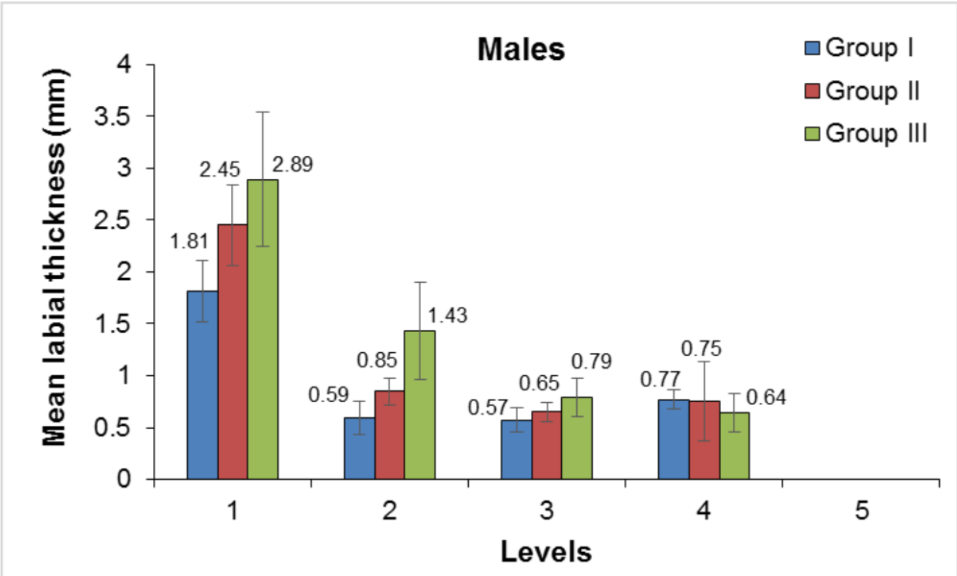
Graph 3: Column chart showing average angle of inclination according to gender across each study group.



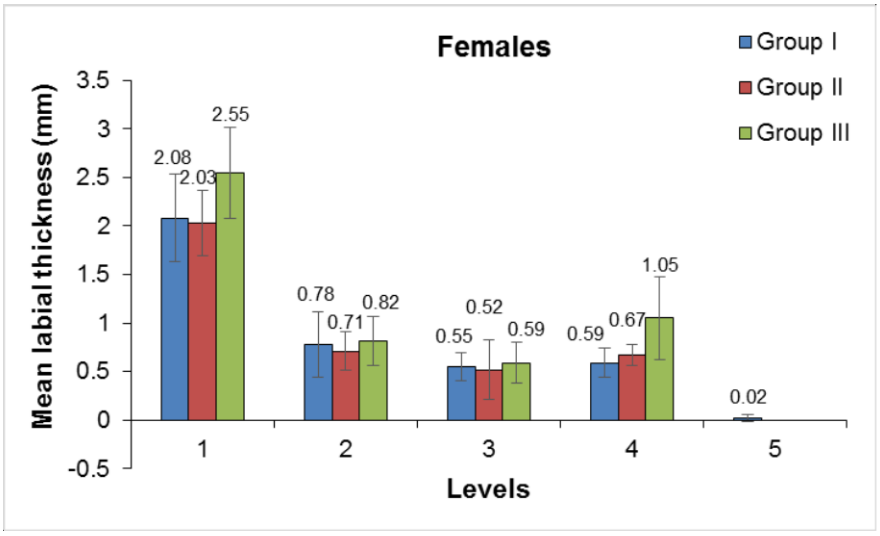
Graph 4: Column chart showing average root length according to gender in each study group.



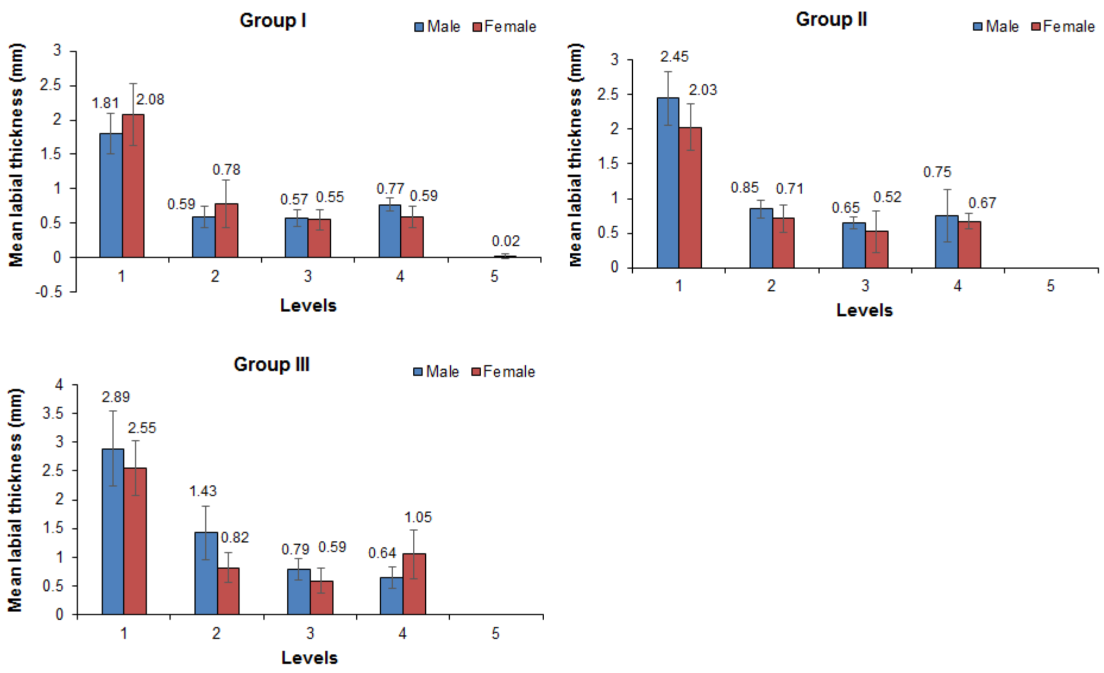
Graph 5: Column chart showing mean labial bone thickness of all individuals across three study groups at different root levels.



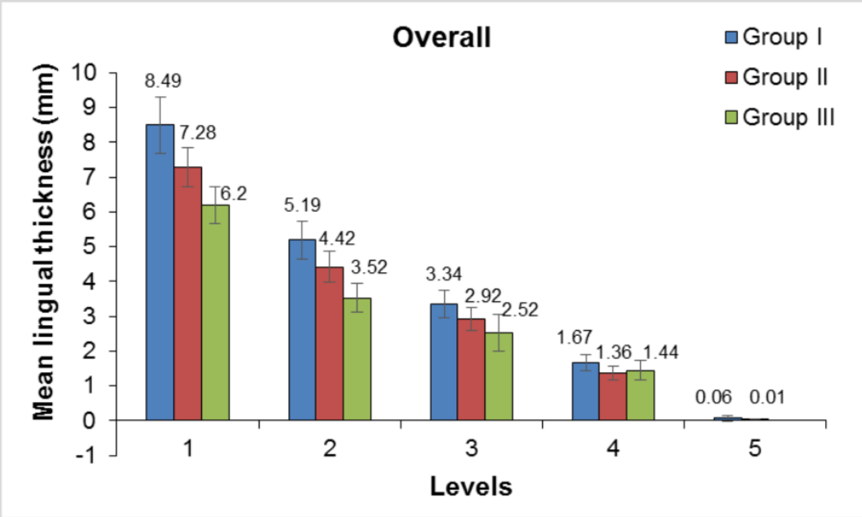
Graph 6: Column chart showing mean labial bone thickness in males across three study groups at different root levels.



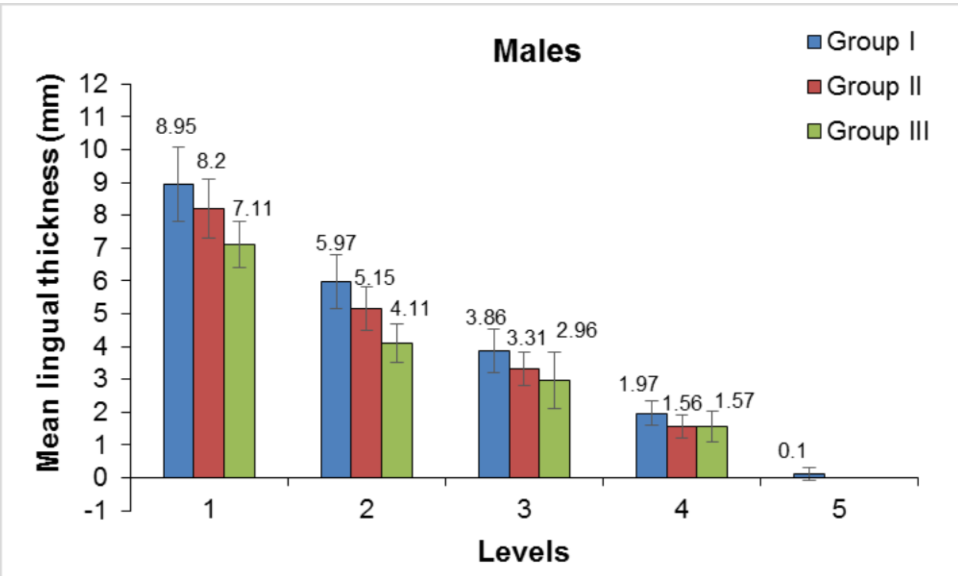
Graph 7: Column chart showing mean labial bone thickness in females across three study groups at different root levels.



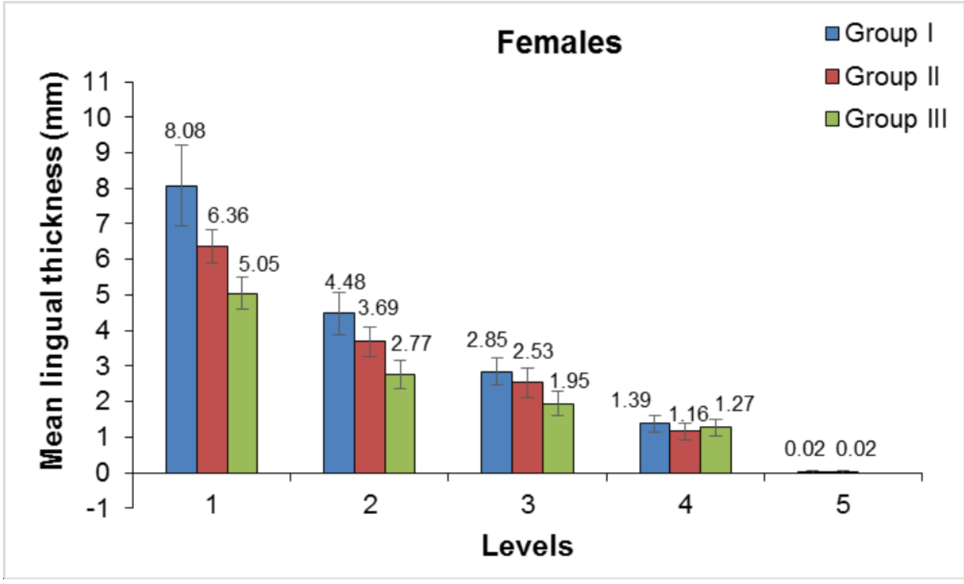
Graph 8: Column charts showing mean labial bone thickness gender wise at each level in three study groups.



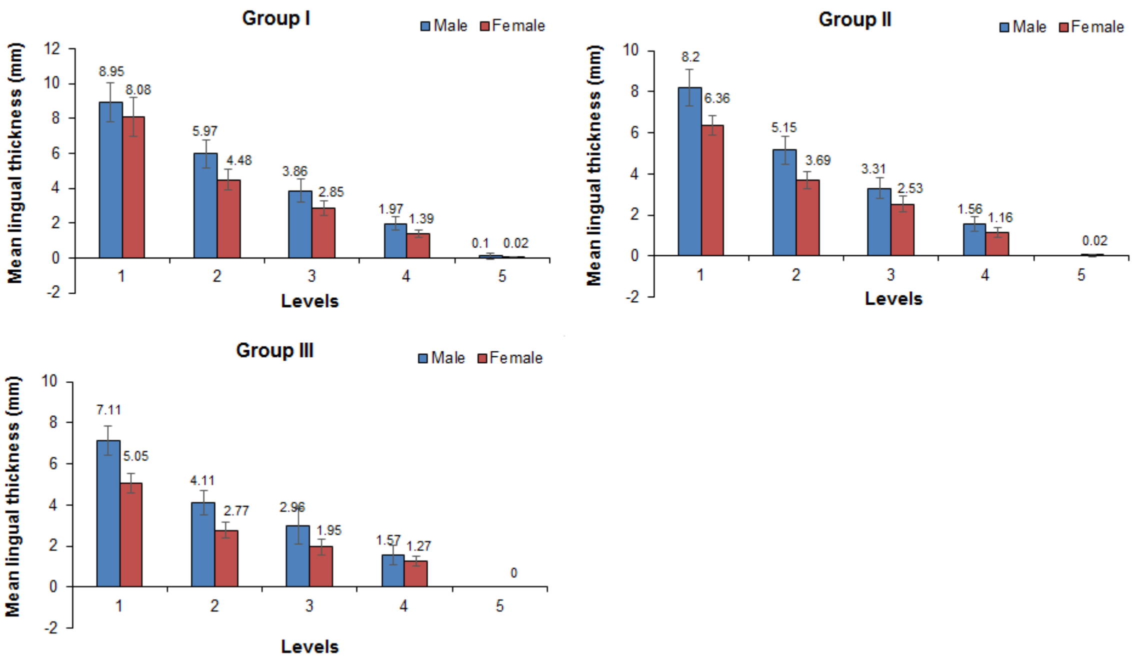
Graph 9: Column chart showing mean lingual bone thickness of all individuals across three study groups at different root levels.



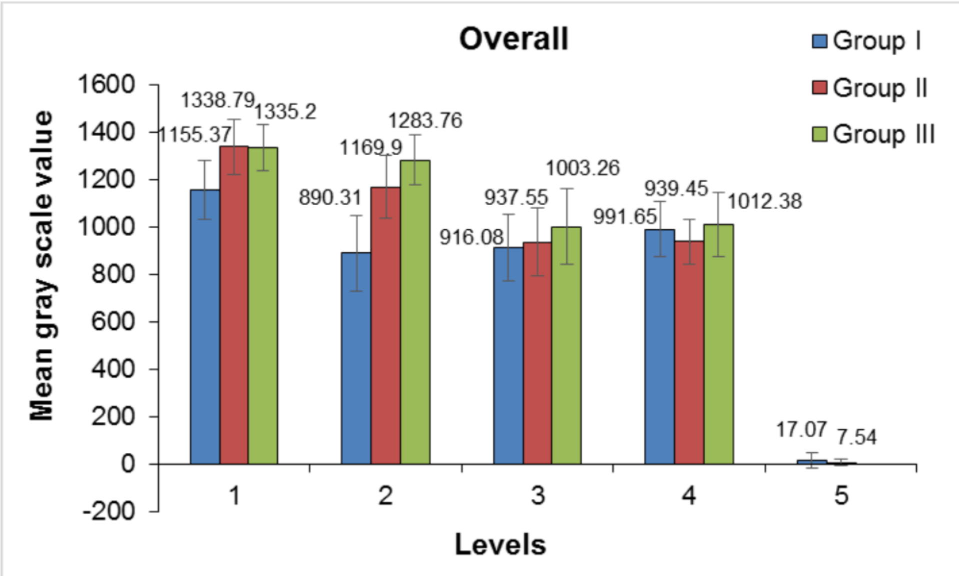
Graph 10: Column chart showing mean lingual bone thickness in males across three study groups at different root levels.



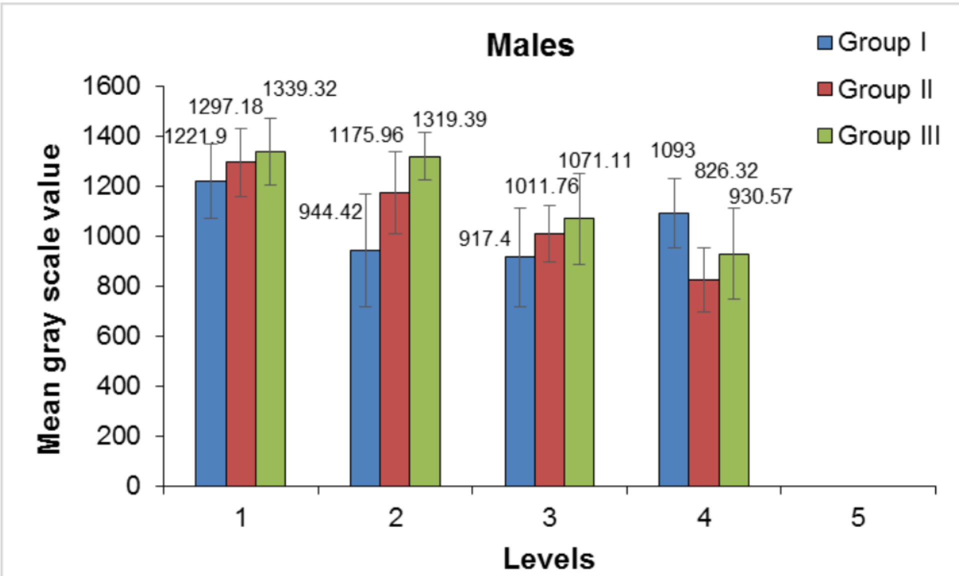
Graph 11: Column chart showing mean lingual bone thickness in females across three study groups at different root levels.



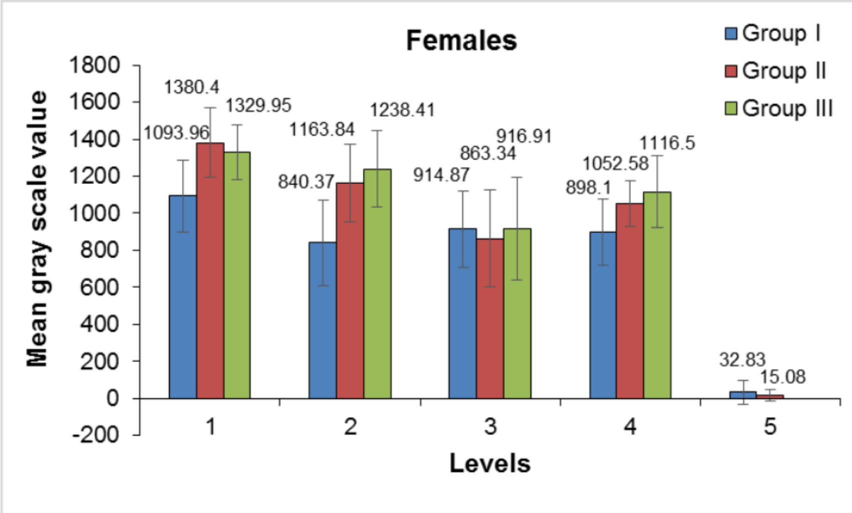
Graph 12: Column charts showing mean lingual bone thickness gender wise at each level in three study groups.



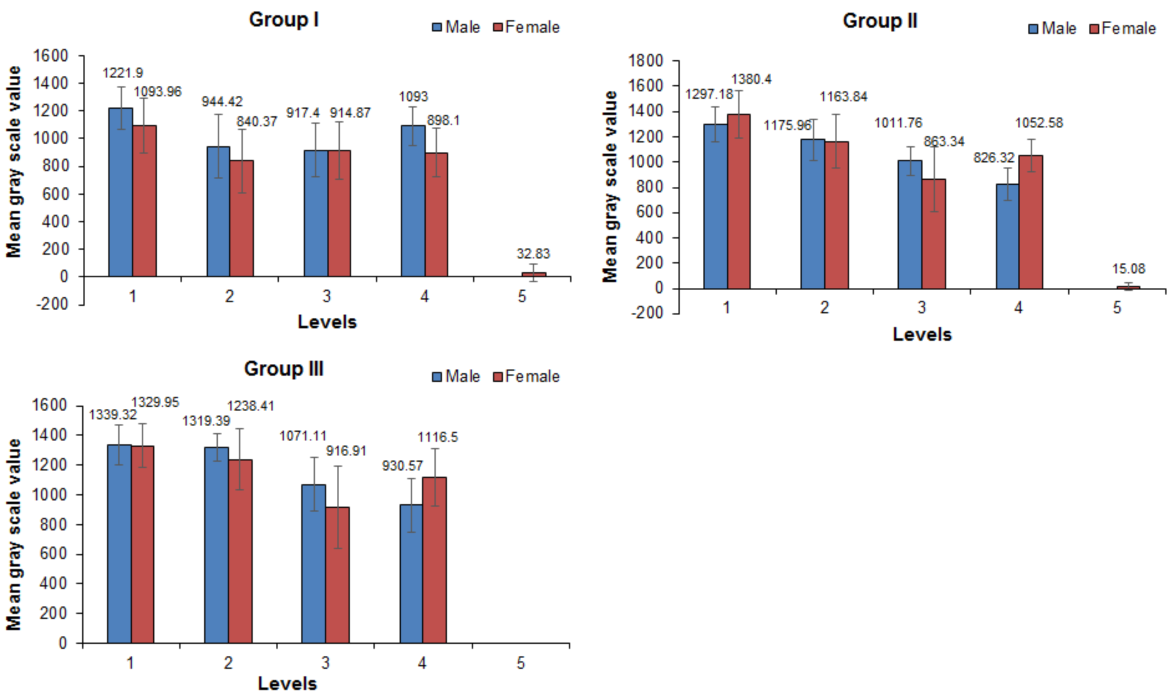
Graph 13: Column chart showing mean gray scale values of all individuals across three study groups at different root levels- Labial side



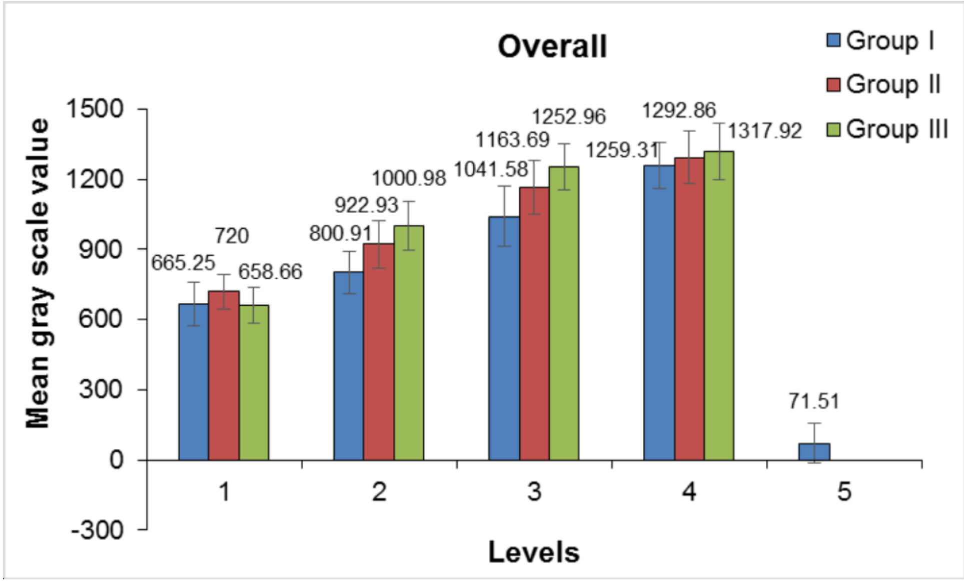
Graph 14: Column chart showing mean gray scale values in males across three study groups at different root levels- Labial side



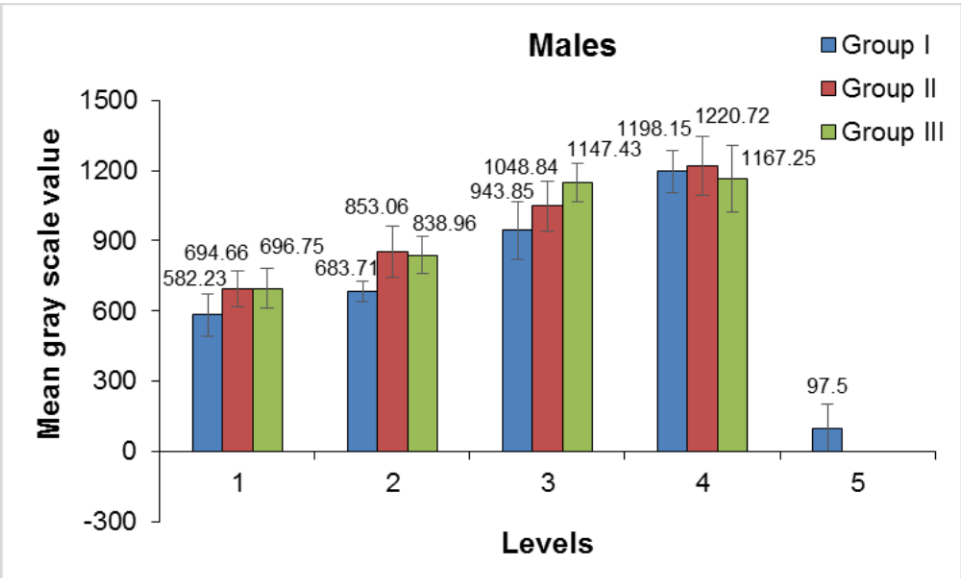
Graph 15: Column chart showing mean gray scale values in females across three study groups at different root levels- Labial side.



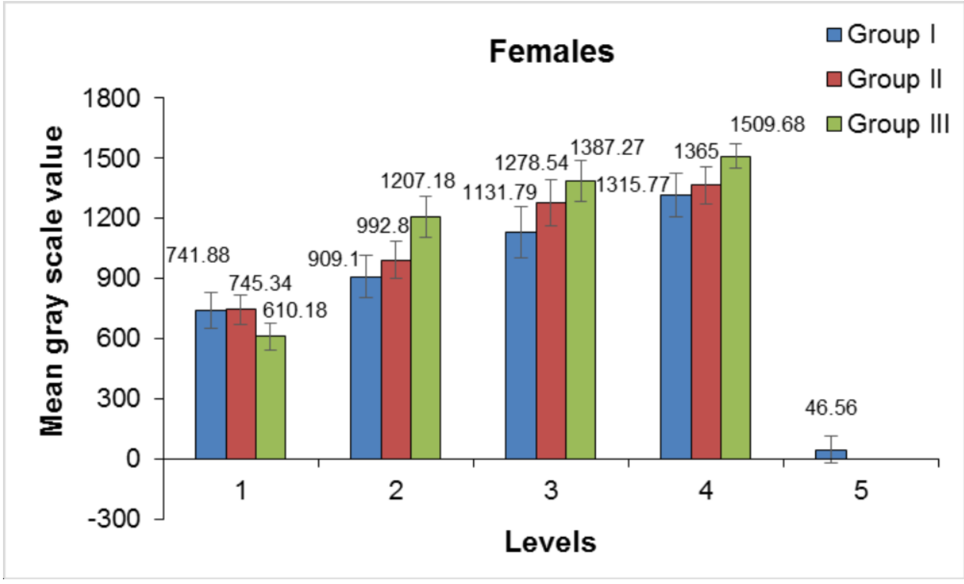
Graph 16: Column charts showing mean levels of gray scale values gender wise at each level in three groups- Labial side.



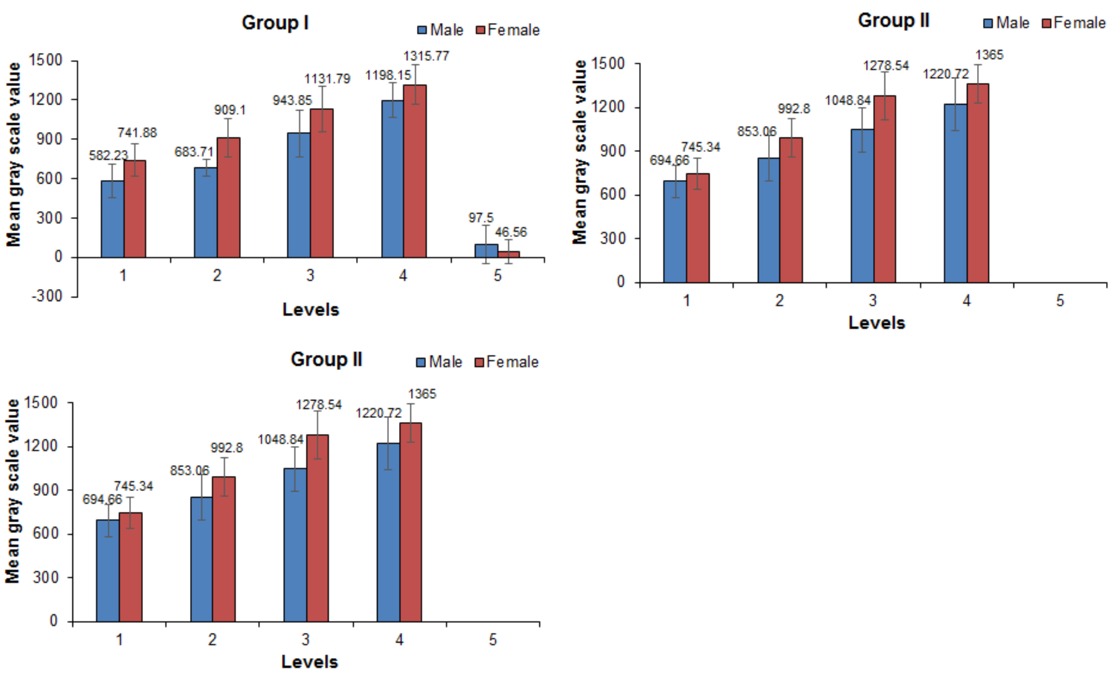
Graph 17: Column chart showing mean gray scale values of all individuals across three study groups at different root levels- Lingual side.



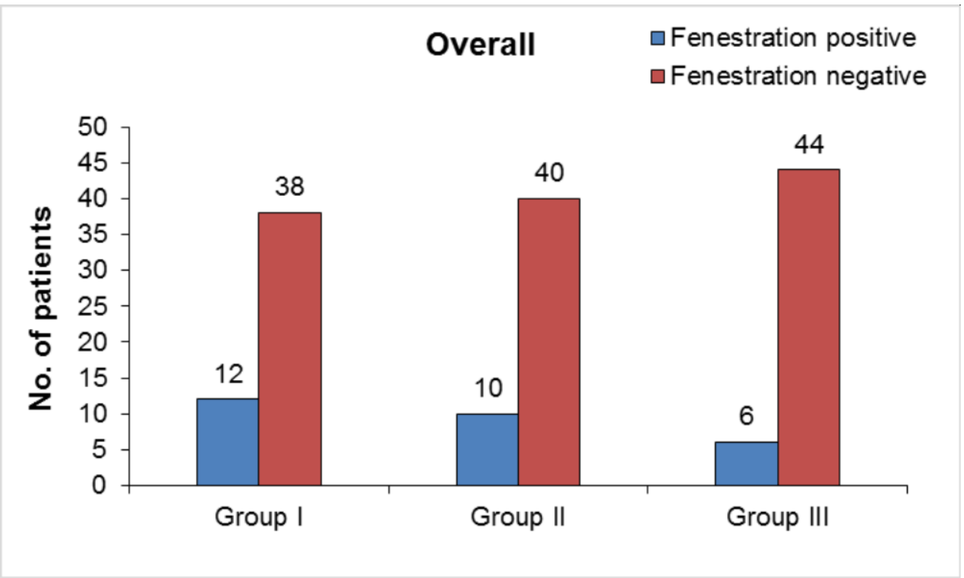
Graph 18: Column chart showing mean gray scale values in males across three study groups at different root levels- Lingual side.



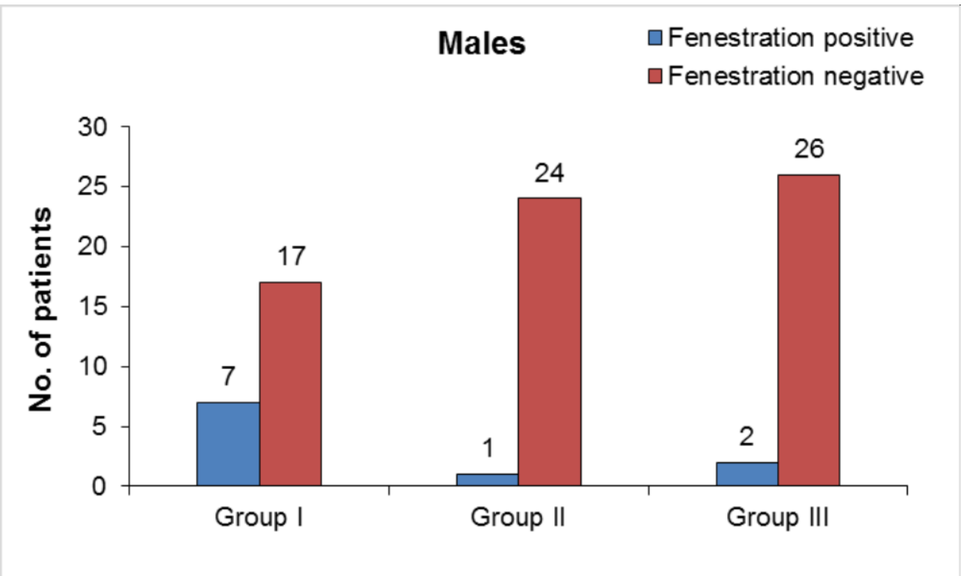
Graph 19: Column chart showing mean gray scale values in females across three study groups at different root levels- Lingual side



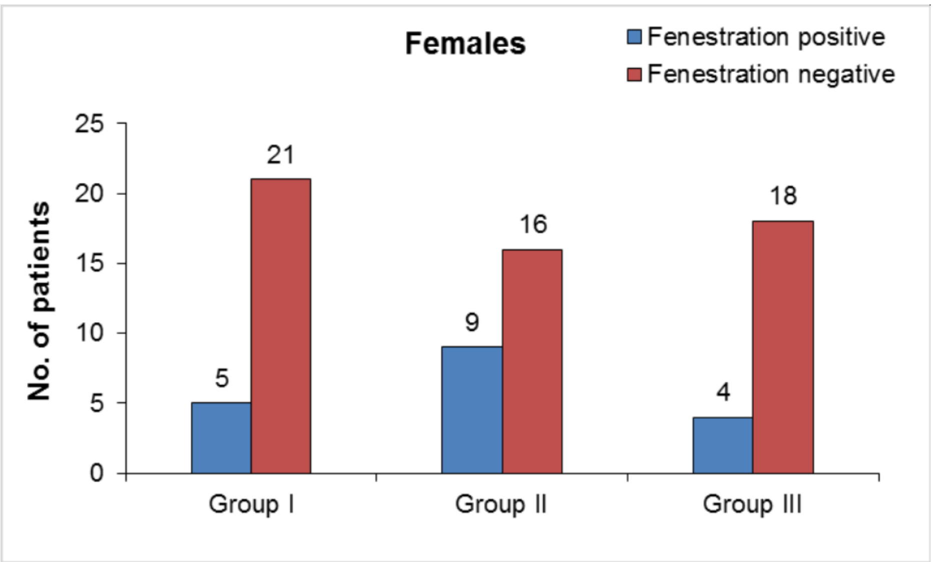
Graph 20: Column charts showing mean gray scale values gender wise at each level in three groups- Lingual side.



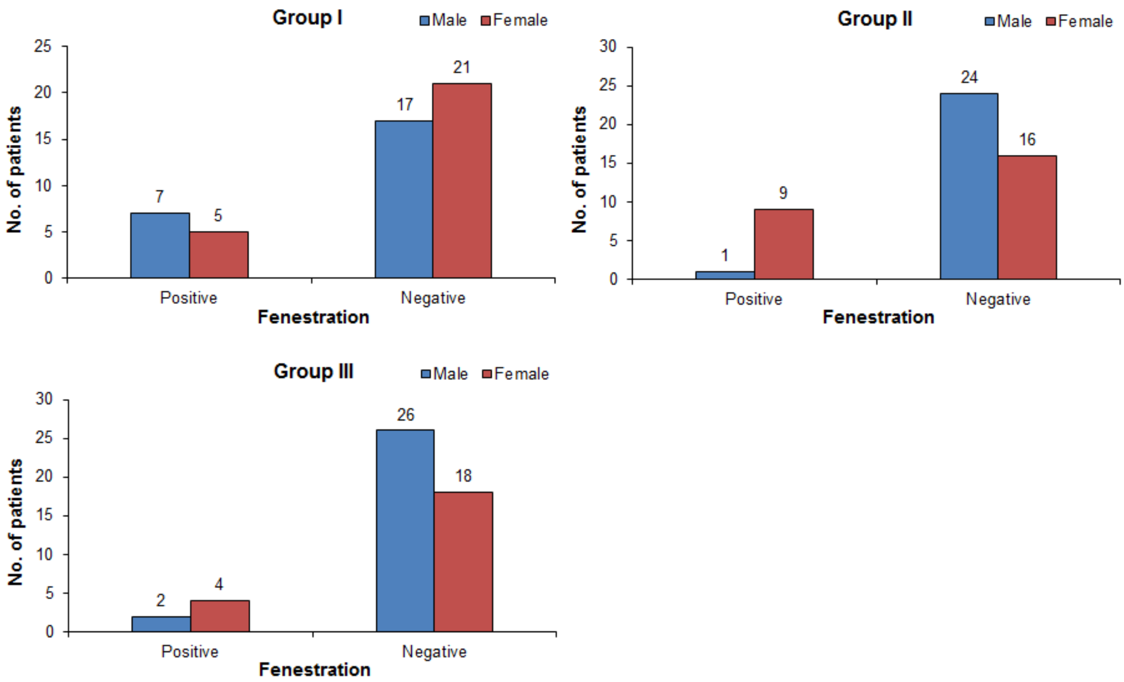
Graph 21: Column chart showing frequency of fenestration across three study groups- Overall.



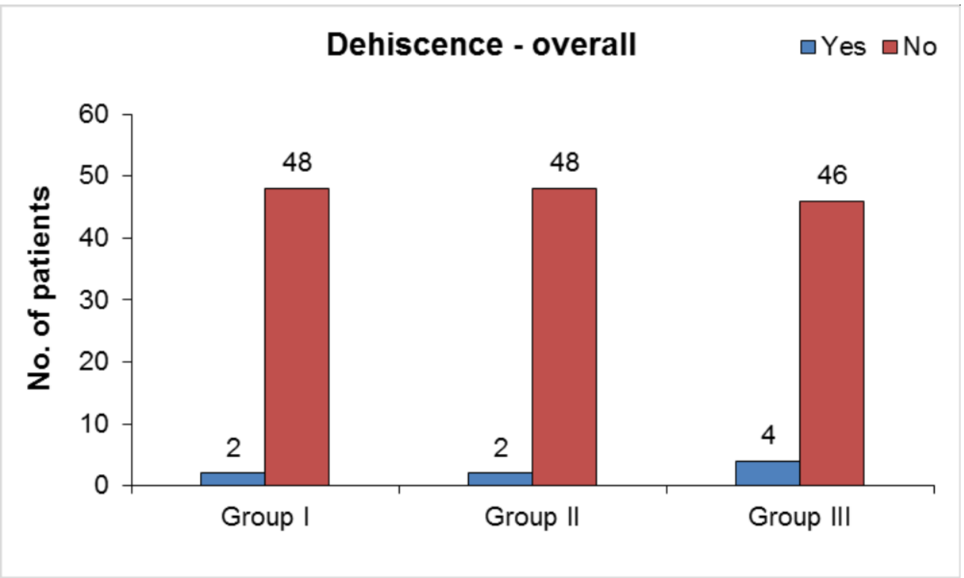
Graph 22: Column chart showing frequency of fenestrations across three study groups- Males.



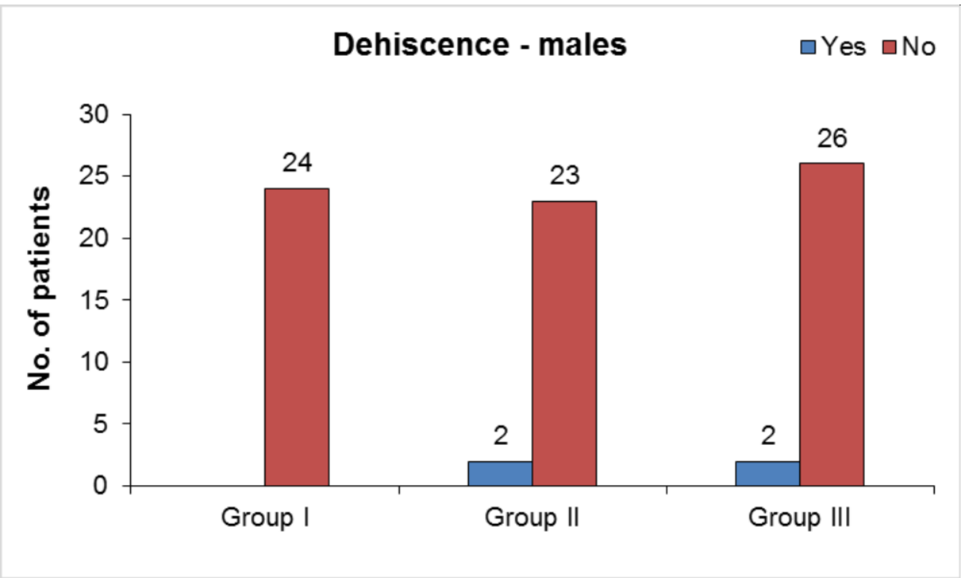
Graph 23: Column chart showing frequency of fenestration across three study groups- Females.



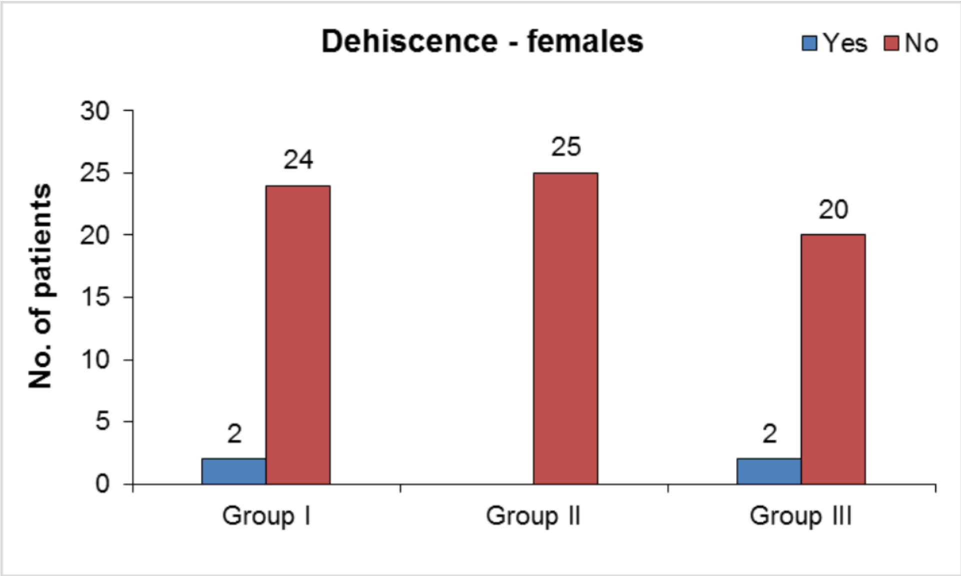
Graph 24: Column charts showing frequency of fenestration across three study groups- Gender wise.



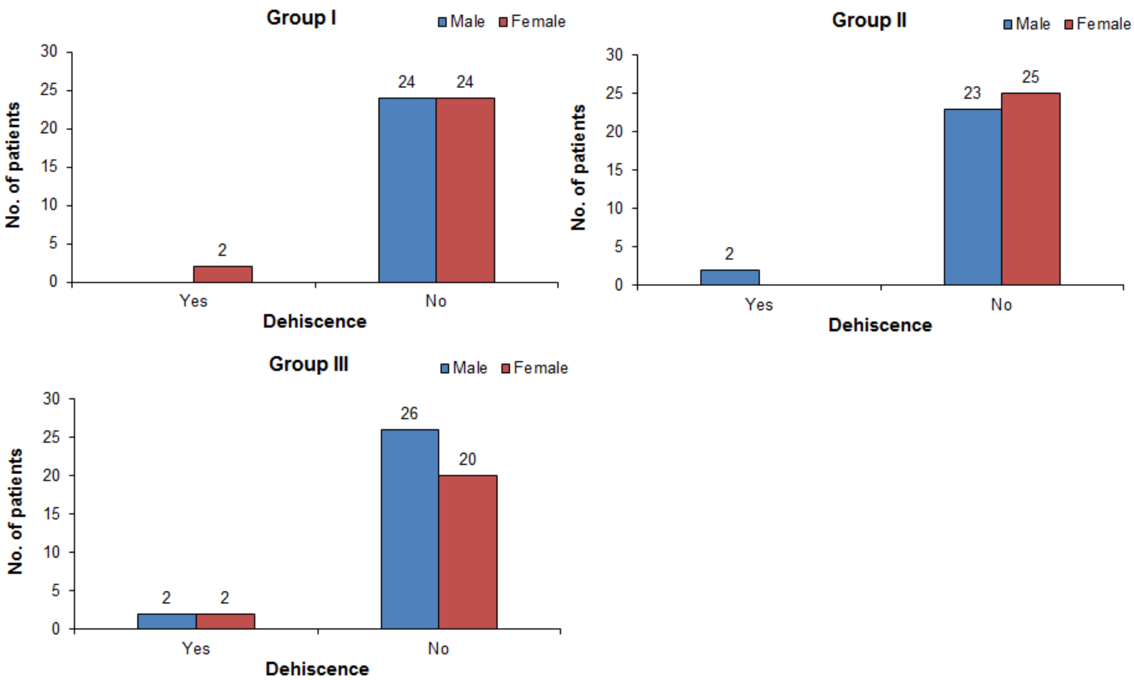
Graph 25: Column chart showing frequency of dehiscence across three study groups- Overall.



Graph 26: Column chart showing frequency of dehiscence across three study groups- Males.



Graph 27: Column chart showing frequency of dehiscence across three study groups- Females.



Graph 28: Column charts showing frequency of dehiscence across three study groups- Gender wise.

ANNEXURE I

CASE PROFORMA

BIODATA OF PATIENT -:

Name –

Age/Sex -

1. **Determination of Group (according to angle of inclination)**

ANGLE OF INCLINATION ________________

- i. **Group-I-: Lingually inclined group (Angle $\leq$ 110.1^{o})**
- ii. **Group-II: Normally inclined group (Angle in between 110.1^{o} -121.5^{o})**
- iii. **Group III: Labially inclined group (Angle>121.5^{o})**

2. **Determination of root length: ________________mm**
3. **Division of root length into 5 Segments (length of each segment):________**

Labial thickness measurements	**Grey Scale values (Density)**
1. **Level 1: _________mm.**	**Level 1: ________ GS.**
2. **Level 2: _________mm.**	**Level 2: ________ GS.**
3. **Level 3: _________mm.**	**Level 3: ________ GS.**
4. **Level 4: _________mm.**	**Level 4: ________ GS .**
5. **Level 5: ________mm.**	**Level 5: _________ GS.**

Lingual thickness measurements	**Grey Scale values (Density)**
1. **Level 1: __________mm.**	**Level 1: ________ GS.**
2. **Level 2: __________mm.**	**Level 2: ________ GS.**
3. **Level 3: __________mm.**	**Level 3: ________ GS.**
4. **Level 4: __________mm.**	**Level 4: ________ GS.**
5. **Level 5: __________mm.**	**Level 5: ________ GS.**

ANNEXURE II

INFORMED CONSENT FORM

Assessment of alveolar bone thickness and bone densities around Maxillary Central Incisors of different inclination: A Cone-Beam Tomography Study.

Patients I.D.:

I, Mr./Master/Mrs./Miss.____

Resident of: _________________________________

_________________________________ aged _____ years, exercising my free will/choice, without any pressure/lure of incentive in any form, hereby give my consent for the project.

I acknowledge that doctor has informed me about this research project suitably and sufficiently to my satisfaction. I agree to let my X-rays, photographs, impressions and other investigations to be taken as required. I agree to take part in this project and will not mix any other projects during the period of this trial. I shall report to the dental hospital or other place where called on given appointment dates and time. I shall inform the doctor on any adverse effects or unusual symptoms noticed by me. I shall co-operate with the doctors and paramedical staff, in all respects. I permit to publishing the results of my participation in this study. I shall not be given any reimbursement or compensation. I have been informed of my right to opt out of this research project at any time without giving any reason for doing so.

I hereby record my consent for participation in the said trial.

1. ___________________ _____________ ________ _________

Patient's name Signature/thumbprint Date Time

2. ___________________ _____________ _________ _________

Investigator's name Signature Date Time

ANNEXURE III
MASTER CHART
GROUP-1

															Alveolar Bone Thickness							
Sr. No.	Age	Sex	Angle of Inclination 1	Angle of Inclinatio n 2	Avgerage Angle of Inclination	Root Length 1	Root Length 2	Average Root length	Levels	Labial Thickness 1	Labial Thickness 2	Average Libal Thickness	Gray Scale value 1	Gray Scale value 2	Avgerage Gray Scale value	Lingual Thickness 1	Lingual Thickness 2	Average Lingual Thickness	Gray Scale value 1	Gray Scale value 2	Average gray scale value	FENESTRATION OR DEHISCENCE
1	25	M	109	110	109.5	11.8	11.9	11.85	Level 1	1.6	1.6	1.6	1339	1243	1291	8.4	8.6	8.5	447	435	441	
					0			0	Level 2	1	0.9	0.95	1338	1643	1490.5	6.4	6.3	6.35	716	700	708	ABSENT
					0			0	Level 3	0.8	0.8	0.8	870	870	870	4.2	4.2	4.2	887	986	936.5	
					0			0	Level 4	0.9	0.8	0.85	903	1095	999	1.9	2.1	2	1553	1484	1518.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
2	18	M	110	110	110	12.5	12.4	12.45	Level 1	2.2	2.3	2.25	1631	1605	1618	6.1	6.4	6.25	485	518	501.5	
					0			0	Level 2	1.1	1.3	1.2	1591	1572	1581.5	3.9	4.1	4	850	817	833.5	ABSENT
					0			0	Level 3	1	1	1	1450	1381	1415.5	2	1.9	1.95	1588	1555	1571.5	
					0			0	Level 4	0.8	0.7	0.75	1047	1047	1047	0.8	0.9	0.85	1448	1293	1370.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
3	28	M	109	107	108	12.8	12.7	12.75	Level 1	1.9	1.9	1.9	1247	1307	1277			0			0	
					0			0	Level 2	1	0.9	0.95	743	824	783.5	8.9	8.8	8.85	984	929	956.5	
					0			0	Level 3	0.9	0.8	0.85	966	1040	1003	5.6	5.3	5.45	959	835	897	ABSENT
					0			0	Level 4	0.6	0.6	0.6	1687	1661	1674	3.9	3.9	3.9	958	925	941.5	
					0			0	Level 5	0	0	0	0	0	0	2.3	2.3	2.3	1687	1590	1638.5	
					0			0				0			0	0	0	0	0	0	0	
					0			0				0			0			0			0	
4	22	F	110	110	110	12.7	12.9	12.8	Level 1	3.1	2.9	3	920	822	871	5.1	5.1	5.1	530	580	555	
					0			0	Level 2	1.2	1.2	1.2	1031	1132	1081.5	2.2	1.7	1.95	837	1009	923	ABSENT
					0			0	Level 3	1	0.8	0.9	1193	1104	1148.5	2.1	1.8	1.95	791	931	861	
					0			0	Level 4	1	0.8	0.9	1442	1154	1298	1.5	1	1.25	1203	1057	1130	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
												0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
5	29	F	100	107	103.5	13.3	13	13.15	Level 1	0	0	0	0	0	0	5.6	5.3	5.45	1242	1178	1210	FENESTRATION
					0			0	Level 2	0	0	0	0	0	0	4.9	2.2	3.55	1449	1464	1456.5	
					0			0	Level 3	0.5	0.4	0.45	402	536	469	1.9	1.6	1.75	1807	1846	1826.5	
					0			0	Level 4	1.4	1.6	1.5	1500	1474	1487	1.5	0.9	1.2	1625	1440	1532.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
6	25	F	104	101	102.5	12.5	12.6	12.55	Level 1	3.8	3.6	3.7	1497	1337	1417	6.7	7.6	7.15	574	430	502	
					0			0	Level 2	1.4	1.1	1.25	1661	1732	1696.5	4.8	4.6	4.7	911	822	866.5	ABSENT
					0			0	Level 3	0.9	0.7	0.8	1469	1512	1490.5	2.9	2.6	2.75	1220	1281	1250.5	
					0			0	Level 4	0.9	1.1	1	1412	1516	1464	1.6	1.9	1.75	1581	1611	1596	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
7	19	M	100	96	98	13.1	13	13.05	Level 1	2.7	2.4	2.55	1034	1079	1056.5	9.33	10.2	9.765	531	44	287.5	
					0			0	Level 2	1.2	0.7	0.95	1062	1089	1075.5	5.5	5.5	5.5	571	471	521	ABSENT
					0			0	Level 3	0.9	0.5	0.7	1326	1023	1174.5	4.1	4	4.05	591	549	570	
					0			0	Level 4	0.9	0.6	0.75	902	907	904.5	2.7	2.6	2.65	740	684	712	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
8	22	F	110	104	107	14.1	13.7	13.9	Level 1	4.9	4.3	4.6	1423	1131	1277	9.8	10.2	10	1040	935	987.5	
					0			0	Level 2	1.2	0.9	1.05	1304	1392	1348	5.2	4.3	4.75	971	717	844	ABSENT
					0			0	Level 3	0.6	0.5	0.55	1290	1502	1396	3.5	3.3	3.4	641	716	678.5	
					0			0	Level 4	0.7	0.6	0.65	1369	1261	1315	1.7	1.8	1.75	1125	1265	1195	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
9	30	F	107	109	108	11.5	11.4	11.45	Level 1	1.2	1.2	1.2	765	1011	888	6.3	6.4	6.35	420	375	397.5	
					0			0	Level 2	0.4	0.3	0.35	866	797	831.5	3.6	3.6	3.6	547	706	626.5	ABSENT

					0			0	Level 3	0.4	0.3	0.35	1192	964	1078	2.3	1.9	2.1	1535	1558	1546.5	
					0			0	Level 4	0	0	0	0	0	0	0.7	0.7	0.7	1323	1347	1335	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
10	29	M	104	103	103.5	12.2	12.4	12.3	Level 1	1.6	1.3	1.45	1370	1398	1384	7.1	7.2	7.15	757	586	671.5	
					0			0	Level 2	1	0.6	0.8	999	1088	1043.5	4.6	4.2	4.4	758	778	768	ABSENT
					0			0	Level 3	0.9	0.6	0.75	948	737	842.5	2.2	2.6	2.4	723	802	762.5	
					0			0	Level 4	1.2	1.1	1.15	1064	1193	1128.5	1.6	1.8	1.7	1212	1285	1248.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
11	19	F	107	102	104.5	13	12.9	12.95	Level 1	1	0.8	0.9	534	762	648	14.7	14.5	14.6	345	260	302.5	
					0			0	Level 2	0.9	0.5	0.7	694	636	665	8.3	8.1	8.2	546	479	512.5	ABSENT
					0			0	Level 3	0.8	0.6	0.7	740	805	772.5	5.4	5.6	5.5	379	325	352	
					0			0	Level 4	0.9	0.6	0.75	699	808	753.5	3.2	3.4	3.3	1390	1344	1367	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
12	30	M	105	107	106	13.5	13.7	13.6	Level 1	1.5	1.1	1.3	1161	1062	1111.5	6.6	7.1	6.85	716	681	698.5	
					0			0	Level 2	0.4	0.3	0.35	901	1160	1030.5	4.2	4.1	4.15	641	701	671	ABSENT
					0			0	Level 3	0.3	0.1	0.2	725	529	627	2.4	2.2	2.3	1408	1371	1389.5	
					0			0	Level 4	0.4	0.1	0.25	472	728	600	0.8	0.9	0.85	1238	1160	1199	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
13	26	F	110	108	109	12.1	12.3	12.2	Level 1	1.5	1.1	1.3	1666	1530	1598	5.7	5.7	5.7	700	629	664.5	
					0			0	Level 2	1	0.5	0.75	1345	1439	1392	2.3	2	2.15	649	807	728	ABSENT
					0			0	Level 3	0.9	0.6	0.75	1646	1841	1743.5	1.3	1.1	1.2	1424	1240	1332	
					0			0	Level 4	0.9	0.6	0.75	1450	1617	1533.5	1	0.7	0.85	946	1175	1060.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0	0		0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
14	27	F	109	103	106	12.8	12.9	12.85	Level 1	2	1.9	1.95	1600	1886	1743	6.9	6.9	6.9	848	859	853.5	
					0			0	Level 2	0.9	0.6	0.75	1082	1206	1144	2.8	2.7	2.75	1508	1588	1548	ABSENT
					0			0	Level 3	0.8	0.5	0.65	1037	1166	1101.5	2.1	1.8	1.95	1870	1848	1859	
					0			0	Level 4	0.7	0.5	0.6	948	1031	989.5	1.1	0.9	1	1478	1533	1505.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
15	22	F	109	110	109.5	11.8	11.9	11.85	Level 1	2.7	2.4	2.55	1488	1629	1558.5	7	7.3	7.15	928	983	955.5	
					0			0	Level 2	0.9	0.7	0.8	1198	1169	1183.5	4.1	4.1	4.1	1560	1645	1602.5	ABSENT
					0			0	Level 3	0.7	0.5	0.6	934	824	879	2.4	2.2	2.3	1319	1376	1347.5	
					0			0	Level 4	0.8	0.6	0.7	884	1033	958.5	1.5	1.4	1.45	1243	1269	1256	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
16	18	F	108	104	106	13	13.1	13.05	Level 1	2.3	1.7	2	1387	1317	1352	7.5	7.3	7.4	576	448	512	
					0			0	Level 2	0.5	0.4	0.45	838	820	829	4.1	3.8	3.95	921	873	897	ABSENT
					0			0	Level 3	0.4	0.2	0.3	909	807	858	2.7	2.3	2.5	1943	1828	1885.5	
					0			0	Level 4	0.5	0.4	0.45	994	841	917.5	0.9	0.7	0.8	1627	1527	1577	
					0			0	Level 5	0.6	0.4	0.5	784	923	853.5	0.7	0.4	0.55	1101	1227	1164	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
17	25	F	108	109	108.5	12.4	12.4	12.4	Level 1	2	1.6	1.8	1248	1310	1279	4.4	4.1	4.25	727	693	710	
					0			0	Level 2	0	0	0	0	0	0	3.4	3.5	3.45	927	1075	1001	ABSENT
					0			0	Level 3	1.4	1.1	1.25	1326	1475	1400.5	2.6	2.9	2.75	855	848	851.5	
					0			0	Level 4	1.3	1.1	1.2	1083	1239	1161	1.9	1.7	1.8	1482	1593	1537.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
18	24	M	110	109	109.5	13.6	13.7	13.65	Level 1	2.4	2.3	2.35	1244	1299	1271.5	10.8	11.3	11.05	533	527	530	
					0	0		0	Level 2	0.9	0.6	0.75	881	1051	966	7.5	8	7.75	652	605	628.5	
					0			0	Level 3	0	0	0	0	0	0	4.9	4.9	4.9	463	594	528.5	FENESTRATION
					0			0	Level 4	0.9	0.9	0.9	1186	1056	1121	2.5	2.5	2.5	1013	1177	1095	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
19	19	M	109	110	109.5	12.4	12.4	12.4	Level 1	1.4	1.1	1.25	1439	1367	1403	8.9	9.2	9.05	440	492	466	

					0			0	Level 2	0	0	0	0	0	0	5.2	5	5.1	822	864	843	FENESTRATION
					0			0	Level 3	0	0	0	0	0	0	3.7	3.5	3.6	926	988	957	
					0			0	Level 4	1	1	1	1375	1426	1400.5	2	1.9	1.95	1356	1383	1369.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
20	21	F	100	101	100.5	11.3	11.4	11.35	Level 1	2	1.7	1.85	1756	1721	1738.5	7.4	6.9	7.15	831	762	796.5	
					0			0	Level 2	1.3	0.6	0.95	1442	1595	1518.5	4.6	4.2	4.4	1280	1290	1285	
					0			0	Level 3	0.9	0.5	0.7	1211	1499	1355	3.6	3.2	3.4	1254	1354	1304	ABSENT
					0			0	Level 4	0	0	0	0	0	0	1.1	0.8	0.95	1622	1519	1570.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
21	29	F	107	105	106	15.2	15.1	15.15	Level 1	1.5	1.2	1.35	1178	1278	1228	8.7	8.6	8.65	813	782	797.5	
					0			0	Level 2	0	0	0	0	0	0	4.7	4.2	4.45	894	1095	994.5	DEHISCENCE
					0			0	Level 3	0	0	0	0	0	0	2.4	2	2.2	1506	1494	1500	
					0			0	Level 4	0	0	0	0	0	0	0.9	0.8	0.85	1490	1357	1423.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0	0	0	0			0			0	
					0			0				0			0			0			0	
22	27	M	109	107	108	13.7	13.9	13.8	Level 1	3	2.7	2.85	1437	1354	1395.5	7.3	7.7	7.5	644		322	
					0			0	Level 2	1	0.4	0.7	1487	1405	1446	4.4	4	4.2	736	578	657	ABSENT
					0			0	Level 3	0.8	0.5	0.65	867	952	909.5	2.5	2.8	2.65	1277	694	985.5	
					0			0	Level 4	0.6	0.6	0.6	865	701	783	1.5	1.7	1.6	1341	1257	1299	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	1403	701.5	
					0			0				0			0			0		0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
23	22	M	104	106	105	12.6	12.2	12.4	Level 1	0	0	0	0	0	0	13.9	13.8	13.85	617	559	588	
					0			0	Level 2	0	0	0	0	0	0	9.2	8.6	8.9	854	723	788.5	FENESTRATION
					0			0	Level 3	0.8	0.5	0.65	746	873	809.5	5.7	5.5	5.6	715	761	738	
					0			0	Level 4	0.9	0.5	0.7	992	950	971	2.9	2.5	2.7	1413	1385	1399	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
24	34	M	101	97	99	13.7	13.4	13.55	Level 1	1.7	1.4	1.55	1140	1225	1182.5	10.3	10.8	10.55	372	420	396	
					0		0	0	Level 2	0.8	0.6	0.7	1130	1266	1198	6.8	6.4	6.6	455	461	458	ABSENT
					0			0	Level 3	0.8	0.6	0.7	846	789	817.5	4.5	4.6	4.55	649	588	618.5	
					0			0	Level 4	0.7	0.7	0.7	708	731	719.5	1.7	1.5	1.6	1140	1243	1191.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
25	29	M	110	110	110	11.1	11.2	11.15	Level 1	2.2	2.3	2.25	1334	1284	1309	7	7.2	7.1	352	365	358.5	
					0			0	Level 2	0	0	0	0	0	0	4.2	4	4.1	624	630	627	FENESTRATION
					0			0	Level 3	0.7	0.4	0.55	882	941	911.5	3	2.5	2.75	1517	1627	1572	
					0			0	Level 4	1	1.2	1.1	1553	1579	1566	1.4	1.1	1.25	1184	1149	1166.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
26	26	M	103	100	101.5	12.4	12.6	12.5	Level 1	1.8	1.6	1.7	1349	1531	1440	7.9	7.7	7.8	343	399	371	
					0		0	0	Level 2	0.8	0.8	0.8	899	1026	962.5	4.3	4.2	4.25	518	457	487.5	ABSENT
					0			0	Level 3	1.1	0.9	1	1404	1464	1434	1.9	2.1	2	1744	1792	1768	
					0			0	Level 4	0.8	0.5	0.65	805	1137	971	1.2	1.3	1.25	1262	1227	1244.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
27	27	M	100	102	101	13.2	13.8	13.5	Level 1	1.4	1.1	1.25	810	1048	929	11.3	11.5	11.4	772	882	827	
				0	0			0	Level 2	0	0	0	0	0	0	6.3	6.7	6.5	725	803	764	FENESTRATION
					0			0	Level 3	0.9	0.6	0.75	1164	1268	1216	4.5	4.2	4.35	565	622	593.5	
					0			0	Level 4	0.8	0.7	0.75	1221	1212	1216.5	1.5	1	1.25	1267	1222	1244.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
28	24	M	110	110	110	13.6	13.9	13.75	Level 1	1.8	1.2	1.5	982	1196	1089	8.6	9.1	8.85	496	607	551.5	
					0			0	Level 2	0	0	0	0	0	0	5.3	5.4	5.35	558	618	588	FENESTRATION
					0			0	Level 3	0	0	0	0	0	0	3.7	3.7	3.7	644	573	608.5	
					0			0	Level 4	1.4	1.2	1.3	1261	1274	1267.5	1.7	1.7	1.7	1193	1204	1198.5	
					0			0	Level 5	0	0	0		0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
29	21	M	109	106	107.5	12.4	12.6	12.5	Level 1	2.8	2.8	2.8	1153	1198	1175.5	7.6	7.3	7.45	616	512	564	
					0			0	Level 2	1	0.7	0.85	1262	1387	1324.5	3.4	3.8	3.6	649	763	706	ABSENT
					0			0	Level 3	0.7	0.5	0.6	828	547	687.5	2.4	2.3	2.35	1281	1308	1294.5	

					0			0	Level 4	0.9	0.5	0.7	1083	927	1005	0.7	0.8	0.75	1344	1125	1234.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
30	38	f	98	90	94	11.8	11.6	11.7	Level 1	1.3	0.7	1	772	576	674	7.4	7.4	7.4	251	298	274.5	
					0			0	Level 2	0.3	0.3	0.3	630	630	630	4.3	3.9	4.1	265	1037	651	ABSENT
					0			0	Level 3	0.2	0.2	0.2	698	862	780	2.7	2.6	2.65	1121	1062	1091.5	
					0			0	Level 4	0.3	0.4	0.35	918	1138	1028	1	0.9	0.95	1080	0	540	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
31	36	F	108	110	109	13.1	12.9	13	Level 1	1.1	0.7	0.9	845	1140	992.5	7.6	12.9	10.25	577	719	648	
					0			0	Level 2	1.2	0.7	0.95	885	1087	986	5.1	5.1	5.1	586	553	569.5	DEHISCENCE
					0			0	Level 3	1.9	1.1	1.5	1145	1019	1082	2.6	3	2.8	1113	1126	1119.5	
					0			0	Level 4	0	0	0	0	0	0	0.9	1.1	1	1283	1269	1276	
					0			0	Level 5	0	0	0			0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
32	25	F	108	109	108.5	14.4	14.7	14.55	Level 1	1.9	1.6	1.75	1676	1875	1775.5	8.3	8.1	8.2	523	420	471.5	
					0			0	Level 2	0.8	0.6	0.7	1384	1299	1341.5	5.3	4.7	5	505	632	568.5	ABSENT
					0			0	Level 3	0.6	0.4	0.5	957	900	928.5	3.5	3.4	3.45	498	564	531	
					0			0	Level 4	0.7	0.6	0.65	1105	1124	1114.5	2.3	1.9	2.1	1673	1559	1616	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
33	19	F	102	99	100.5	15.1	14.3	14.7	Level 1	5.1	4.6	4.85	664	715	689.5	12	12.4	12.2	1062	796	929	
					0	0		0	Level 2	1.2	1	1.1	990	882	936	6.8	6.5	6.65	698	657	677.5	ABSENT
					0			0	Level 3	0.9	0.5	0.7	773	668	720.5	4.5	4.2	4.35	546	644	595	
					0			0	Level 4	0.6	0.4	0.5	552	708	630	1.87	1.6	1.735	1301	1139	1220	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
34	19	F	102	103	102.5	16.2	16.3	16.25	Level 1	2.7	2.8	2.75	448	517	482.5	13.9	15.7	14.8	881	963	922	
					0	0		0	Level 2	0	0	0	0	0	0	7.5	6.9	7.2	727	670	698.5	FENESTRATION
					0			0	Level 3	0.7	0.7	0.7	1170	1043	1106.5	4.7	4.5	4.6	440	475	457.5	
					0			0	Level 4	0.4	0.4	0.4	813	1085	949	1.5	1.3	1.4	1124	1125	1124.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
35	26	M	109	110	109.5	14	13.7	13.85	Level 1	1.5	1.2	1.35	1459	1448	1453.5	9.3	9.3	9.3	683	610	646.5	
					0			0	Level 2	0.5	0.4	0.45	1323	1241	1282	5.5	5.3	5.4	618	638	628	ABSENT
					0			0	Level 3	0.2	0.4	0.3	910	1078	994	3.6	3.9	3.75	1127	1242	1184.5	
					0			0	Level 4	0.6	0.6	0.6	1056	997	1026.5	1.7	1.8	1.75	1384	1387	1385.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
36	25	M	87	84	85.5	13.3	14.5	13.9	Level 1	3.2	2.9	3.05	953	981	967	12.6	12.6	12.6	698	681	689.5	
					0			0	Level 2	0.5	0.5	0.5	1109	1091	1100	12.1	12.9	12.5	747	687	717	ABSENT
					0			0	Level 3	0.5	0.4	0.45	1155	1131	1143	9.5	9.7	9.6	371	328	349.5	
					0			0	Level 4	0.9	0.8	0.85	1036	1049	1042.5	4.3	4	4.15	649	540	594.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
37	33	M	101	107	104	15.5	18.7	17.1	Level 1	1.1	0.8	0.95	590	597	593.5	12.5	12.5	12.5	740	790	765	
					0			0	Level 2	0	0	0	642	771	706.5	8	0.8	4.4	527	465	496	FENESTRATION
					0			0	Level 3	0.5	0.4	0.45	747	949	848	5.4	5.4	5.4	271	338	304.5	
					0			0	Level 4	0.9	0.7	0.8	691	659	675	2.9	3.9	3.4	206	254	230	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
38	35	M	109	110	109.5	12.3	13.1	12.7	Level 1	1.9	1.3	1.6	1483	1340	1411.5	11.3	11	11.15	842	634	738	
					0			0	Level 2	1.1	0.7	0.9	1321	1181	1251	7.4	6.3	6.85	532	471	501.5	ABSENT
					0			0	Level 3	0.6	0.6	0.6	340	344	342	4.5	4.3	4.4	451	491	471	
					0			0	Level 4	0.6	0.6	0.6	1160	1093	1126.5	1.8	1.8	1.8	1049	1118	1083.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
39	28	F	110	108	109	12.5	12.4	12.45	Level 1	3.4	3	3.2	893	1119	1006	5.8	6	5.9	920	812	866	
					0			0	Level 2	1.1	0.5	0.8	1533	1516	1524.5	3.6	3.3	3.45	1508	1642	1575	ABSENT

					0			0	Level 3	0.5	0.5	0.5	1362	1120	1241	2.5	2.3	2.4	1351	1324	1337.5	
					0			0	Level 4	0.7	0.5	0.6	722	958	840	1.2	0.4	0.8	1243	1112	1177.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
40	24	F	108	109	108.5	13.5	13.4	13.45	Level 1	1.7	2.1	1.9	295	305	300	12.9	12.1	12.5	453	414	433.5	
					0			0	Level 2	1.7	2	1.85	745	623	684	6.6	6.3	6.45	254	238	246	ABSENT
					0			0	Level 3	0.9	0.7	0.8	828	1055	941.5	3.9	3.7	3.8	333	219	276	
					0			0	Level 4	0.7	0.5	0.6	814	1021	917.5	2	1.8	1.9	1249	1211	1230	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
41	32	M	102	109	105.5	12.3	11.9	12.1	Level 1	0.9	1.1	1	1142	1104	1123	10.2	10.2	10.2	1098	1221	1159.5	
					0			0	Level 2	0.8	0.7	0.75	1133	1021	1077	7.4	7.2	7.3	1105	1214	1159.5	ABSENT
					0			0	Level 3	0.5	0.7	0.6	1233	1225	1229	0.6	5.6	3.1	1716	1683	1699.5	
					0			0	Level 4	0.6	0.5	0.55	967	1197	1082	3	3.1	3.05	1680	1734	1707	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
42	23	M	109	107	108	14.2	14	14.1	Level 1	2.2	2.1	2.15	1815	1875	1845	8.4	8.2	8.3	406	453	429.5	
					0			0	Level 2	0.7	0.6	0.65	1472	1262	1367	5.6	5.6	5.6	587	668	627.5	ABSENT
					0			0	Level 3	0.6	0.6	0.6	1513	1308	1410.5	3.8	3.6	3.7	365	567	466	
					0			0	Level 4	0.7	0.6	0.65	1473	1594	1533.5	2.6	2.2	2.4	1382	1326	1354	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
43	23	M	106	108	107	14.1	14	14.05	Level 1	2.7	2.6	2.65	1740	1658	1699	8.9	8.4	8.65	1626	1624	1625	
					0			0	Level 2	1.1	1	1.05	1956	1847	1901.5	6.2	5.9	6.05	762	632	697	ABSENT
					0			0	Level 3	0.6	0.6	0.6	1948	1885	1916.5	3	3.4	3.2	1266	1457	1361.5	
					0			0	Level 4	0.6	0.6	0.6	1783	2014	1898.5	1.6	1.1	1.35	1624	1464	1544	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
44	24	F	108	108	108	12.5	12.5	12.5	Level 1	2	2	2	1497	1528	1512.5	7.2	7.2	7.2	1348	1312	1330	
					0			0	Level 2	0.8	0.8	0.8	989	845	917	3.7	3.7	3.7	1224	1124	1174	
					0			0	Level 3	0	0	0	0	0	0	1.9	1.9	1.9	1289	1291	1290	FENESTRATION
					0			0	Level 4	0.6	0.6	0.6	1110	1264	1187	0.6	0.6	0.6	1546	1434	1490	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
45	31	M	105	104	104.5	10.1	10.3	10.2	Level 1	2.4	2.1	2.25	1275	1325	1300	8.6	9.3	8.95	377	316	346.5	
					0			0	Level 2	0.9	0.8	0.85	1052	1106	1079	5.6	5.4	5.5	575	579	577	ABSENT
					0			0	Level 3	0.9	0.8	0.85	1403	1430	1416.5	2.8	2.7	2.75	1015	1035	1025	
					0			0	Level 4	1	1.1	1.05	856	91	473.5	1.1	0.9	1	1441	1408	1424.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
46	21	F	109	109	109	13.3	13.7	13.5	Level 1	3	3	3	1144	1093	1118.5	10.7	10.7	10.7	1109	1287	1198	
					0			0	Level 2	0.6	8	4.3	970	1141	1055.5	6.6	6.3	6.45	665	681	673	ABSENT
					0			0	Level 3	0.7	0.7	0.7	1140	1287	1213.5	3	2.7	2.85	1225	1205	1215	
					0			0	Level 4	0.9	0.9	0.9	1178	1154	1166	1.5	1.5	1.5	1215	1365	1290	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
47	27	F	109	108	108.5	12.6	12.6	12.6	Level 1	1.6	0.8	1.2	526	557	541.5	7.2	6.9	7.05	987	884	935.5	
					0			0	Level 2	0.3	0	0.15	420	0	210	5.7	5.8	5.75	1004	1176	1090	
					0			0	Level 3	0	0	0	582	0	291	4.2	4.3	4.25	1208	1269	1238.5	FENESTRATION
					0			0	Level 4	0.4	0.3	0.35	987	583	785	2.3	2.3	2.3	1664	1556	1610	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
48	26	F	109	108	108.5	12.5	12.5	12.5	Level 1	2.6	2.4	2.5	1998	1901	1949.5	6.7	6.6	6.65	1365	1295	1330	
					0			0	Level 2	1.1	1	1.05	1838	1913	1875.5	3.3	3.2	3.25	1112	1267	1189.5	ABSENT
					0			0	Level 3	0.9	0.5	0.7	1859	1721	1790	2.4	2.2	2.3	1117	1133	1125	
					0			0	Level 4	1	0	0.5	920	1173	1046.5	1.6	1.2	1.4	1949	1934	1941.5	
					0			0	Level 5	0		0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	

					0			0				0			0			0			0	
49	27	F	105	108	106.5	12.9	12.2	0	Level 1	1.5	1.3	1.4	947	884	915.5	6.6	6.8	6.7	395	383	389	
					0			0	Level 2	0	0	0	0	0	0	4	3.8	3.9	998	939	968.5	FENESTRATION
					0			0	Level 3	0	0	0	0	0	0	2	2.3	2.15	1407	1627	1517	
					0			0	Level 4	0.3	0.2	0.25	982	820	901	1.5	1.3	1.4	1599	1618	1608.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
50	18	F	108	109	108.5	9.6	9.7	9.65	Level 1	1.3	1.3	1.3	929	846	887.5	4.2	4.9	4.55	309	327	318	
					0			0	Level 2	0	0	0	0	0	0	3.5	3.5	3.5	281	260	270.5	FENESTRATION
					0			0	Level 3	0	0	0	0	0	0	2.3	3.3	2.8	1006	1071	1038.5	
					0			0	Level 4	1.2	1	1.1	947	870	908.5	1.3	1.3	1.3	0	0	0	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0			0	0			0			0			0	

GROUP-2

Sr. No	Age	Sex	Angle of Inclination 1	Angle of Inclination 2	Avgerage Angle of Inclination	Root Length 1	Root Length 2	Average Root length	Alveolar Bone Thickness													FENESTRATION OR DEHISCENCE
									Levels	Labial Thickness 1	Labial Thickness 2	Average Libal Thickness	Gray Scale value 1	Gray Scale value 2	Avgerage Gray Ssacle valur	Lingual Thickness 1	Lingual Thickness 2	Average Lingual Thickness	Gray Scale value 1	Gray Scale value 2	Average gray scale value	
1	27	M	121	121	121	12	11.9	11.95	Level 1	2	2.3	2.15	1344	1064	1204	5.4	5.4	5.4	767	826	796.5	
					0			0	Level 2	1.5	1.2	1.35	1482	1238	1360	3.5	3.7	3.6	1568	1498	1533	ABSENT
					0			0	Level 3	1.2	1	1.1	1521	1428	1474.5	1.6	1.8	1.7	1769	1746	1757.5	
					0			0	Level 4	0.9	0.9	0.9	1136	719	927.5	1	1.1	1.05	1554	1532	1543	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
2	19	M	111	111	111	14.5	14.2	14.35	Level 1	1.7	1.5	1.6	1066	1172	1119	15.2	14.2	14.7	1233	922	1077.5	
					0			0	Level 2	0.8	1	0.9	678	961	819.5	10	9.7	9.85	477	434	455.5	ABSENT
					0			0	Level 3	0.7	0.8	0.75	617	812	714.5	7.2	7.1	7.15	798	936	867	
					0			0	Level 4	0.6	0.6	0.6	886	761	823.5	3.7	3.8	3.75	654	802	728	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0		0	
3	24	M	114	113	113.5	11.9	11.7	11.8	Level 1	3.2	3.1	3.15	1254	1720	1487	10.6	10.3	10.45	205	271	238	
					0			0	Level 2	1.2	1.1	1.15	924	994	959	7.2	7.2	7.2	336	547	441.5	ABSENT
					0			0	Level 3	0.8	0.9	0.85	1100	1198	1149	4.9	5.1	5	413	322	367.5	
					0			0	Level 4	0.7	0.7	0.7	932	615	773.5	2.8	2.6	2.7	1292	1292	1292	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
4	30	M	120	121	120.5	12.9	12.7	12.8	Level 1	2.2	2.2	2.2	760	821	790.5	8.7	8.4	8.55	722	782	752	
					0			0	Level 2	0.9	0.9	0.9	675	782	728.5	4.9	5	4.95	624	636	630	ABSENT
					0			0	Level 3	0.7	0.8	0.75	661	698	679.5	3.7	3.5	3.6	956	942	949	
					0			0	Level 4	0.9	1	0.95	757	701	729	1.5	1.5	1.5	1444	1499	1471.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
5	24	M	115	117	116	12	12.1	12.05	Level 1	1.4	1.6	1.5	1055	1047	1051	8.7	8.3	8.5	1222	1173	1197.5	
					0			0	Level 2	1.1	1.1	1.1	625	498	561.5	5.6	5.7	5.65	696	659	677.5	ABSENT
					0			0	Level 3	0.9	1.1	1	473	386	429.5	3.8	4	3.9	800	953	876.5	
					0			0	Level 4	1	9	5	714	976	845	2.1	2.3	2.2	1208	1180	1194	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
6	30	M	120	119	119.5	13.4	13.7	13.55	Level 1	2	1.8	1.9	1017	909	963	8.9	9.2	9.05	400	405	402.5	
					0			0	Level 2	1	0.8	0.9	751	826	788.5	5.4	5.3	5.35	521	573	547	ABSENT
					0			0	Level 3	1	0.8	0.9	810	947	878.5	3	2.9	2.95	701	674	687.5	
					0			0	Level 4	0.4	0.4	0.4	506	417	461.5	0	0	0	0	0	0	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
7	27	M	120	117	118.5	14.1	13.6	13.85	Level 1	2.2	2.2	2.2	1752	1934	1843	5	4.7	4.85	621	626	623.5	
					0			0	Level 2	1	1.2	1.1	1074	1178	1126	3.9	3.7	3.8	1358	1225	1291.5	ABSENT
					0			0	Level 3	0.5	0.6	0.55	929	929	929	2.4	2.2	2.3	1610	1542	1576	
					0			0	Level 4	0.5	0.5	0.5	993	873	933	1.5	1.5	1.5	1491	1432	1461.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
8	22	F	119	120	119.5	14.8	14.6	14.7	Level 1	2.4	2.5	2.45	1891	1975	1933	5	5.4	5.2	742	871	806.5	
					0			0	Level 2	0.4	0.4	0.4	1645	731	1188	3.8	3.6	3.7	978	1086	1032	ABSENT
					0			0	Level 3	0.6	0.3	0.45	1275	768	1021.5	2.3	2.3	2.3	1498	1148	1323	
					0			0	Level 4	0.9	0.9	0.9	1515	1542	1528.5	0.8	0.7	0.75	1445	1446	1445.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
9	28	F	119	115	117	12.4	12.6	12.5	Level 1	1.9	2	1.95	1830	1726	1778	4.9	5.3	5.1	679	846	762.5	
					0			0	Level 2	0.4	0.5	0.45	1466	1339	1402.5	2.5	2.4	2.45	1408	1215	1311.5	
					0			0	Level 3	0	0	0	0	0	0	1.4	1.4	1.4	1533	1483	1508	FENESTRATION
					0			0	Level 4	0.2	0.4	0.3	696	877	786.5	0.7	1	0.85	1529	1531	1530	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
10	25	F	115	117	116	13.5	13.3	13.4	Level 1	2.9	2.6	2.75	1857	2095	1976	7.6	7.1	7.35	1448	1432	1440	
					0			0	Level 2	1.3	1	1.15	1881	1624	1752.5	4.8	4.9	4.85	1234	1172	1203	ABSENT

					0			0	Level 3	0.9	0.8	0.85	1797	1704	1750.5	3.3	3.6	3.45	1814	1632	1723	
					0			0	Level 4	1.1	1.1	1.1	1090	1163	1126.5	2	2.3	2.15	1454	1585	1519.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
11	30	F	113	116	114.5	14.7	14.5	14.6	Level 1	2.3	2.1	2.2	1225	1169	1197	4.8	5.2	5	691	648	669.5	
					0			0	Level 2	0.6	0.4	0.5	761	615	688	2	2.4	2.2	1227	1287	1257	
					0			0	Level 3	0	0	0	0	0	0	0.9	0.8	0.85	1518	1634	1576	FENESTRATION
					0			0	Level 4	0.8	0.7	0.75	670	806	738	0.9	0.7	0.8	1380	1251	1315.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
12	25	F	117	116	116.5	11.7	12	11.85	Level 1	2.7	2.4	2.55	1552	1534	1543	6.4	7	6.7	413	415	414	
					0			0	Level 2	1	0.6	0.8	1126	1245	1185.5	3.7	4	3.85	650	621	635.5	
					0			0	Level 3	0	0	0	0	0	0	2.7	2.6	2.65	943	1062	1002.5	FENESTRATION
					0			0	Level 4	0.7	0.4	0.55	734	754	744	1.6	1.3	1.45	1148	1231	1189.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
13	29	M	119	117	118	15.2	14.4	14.8	Level 1	1.7	1.4	1.55	1067	962	1014.5	9.3	9	9.15	473	380	426.5	
					0			0	Level 2	0.7	0.7	0.7	957	1039	998	5.8	5.9	5.85	609	532	570.5	ABSENT
					0			0	Level 3	0.6	0.5	0.55	907	1047	977	4.3	4	4.15	592	678	635	
					0			0	Level 4	1	0.8	0.9	854	605	729.5	2.6	2.1	2.35	957	734	845.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
14	31	M	115	112	113.5	14.2	14.4	14.3	Level 1	5.9	5.4	5.65	755	881	818	7.6	8.2	7.9	680	394	537	
					0			0	Level 2	1.4	1	1.2	1349	1499	1424	4.4	4.9	4.65	451	414	432.5	ABSENT
					0			0	Level 3	0.6	0.4	0.5	895	850	872.5	2.4	3.2	2.8	919	889	904	
					0			0	Level 4	0.5	0.3	0.4	698	655	676.5	1.3	2.4	1.85	1312	1330	1321	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
15	30	F	120	115	117.5	12.4	12.2	12.3	Level 1	1.8	2.2	2	1413	1224	1318.5	8.4	8.5	8.45	411	445	428	
					0			0	Level 2	0.4	0.3	0.35	1048	826	937	5.7	4.6	5.15	882	755	818.5	ABSENT
					0			0	Level 3	0.1	0.2	0.15	1024	790	907	3.3	2.7	3	1468	1331	1399.5	
					0			0	Level 4	0.2	0.3	0.25	647	840	743.5	1.3	1.4	1.35	1447	1670	1558.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
16	28	M	120	118	119	12.4	12.2	12.3	Level 1	3.2	3.1	3.15	941	1162	1051.5	7.2	7.4	7.3	550	549	549.5	
					0		0	0	Level 2	1	0.8	0.9	1389	1349	1369	4.3	4.2	4.25	782	796	789	ABSENT
					0			0	Level 3	0.7	0.5	0.6	1195	1136	1165.5	2.6	2.5	2.55	1172	1116	1144	
					0			0	Level 4	0	0	0	533	556	544.5	1.6	1.6	1.6	1256	1352	1304	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
17	27	M	120	119	119.5	12.9	13.1	13	Level 1	2.1	2.1	2.1	796	957	876.5	6.2	6.2	6.2	1223	962	1092.5	
					0			0	Level 2	0.8	0.6	0.7	1208	1291	1249.5	4	4	4	962	887	924.5	
					0			0	Level 3	0.8	0.5	0.65	993	1030	1011.5	2.2	2.4	2.3	1174	1253	1213.5	DEHISCENCE
					0			0	Level 4	0	0	0	954	745	849.5	0.7	0.7	0.7	1235	1487	1361	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
18	35	M	118	116	117	12.8	12.9	12.85	Level 1	3.5	3.4	3.45	1379	1348	1363.5	7.9	8.5	8.2	695	844	769.5	
					0			0	Level 2	1	0.9	0.95	1376	1362	1369	5.2	4.3	4.75	776	819	797.5	ABSENT
					0			0	Level 3	0.6	0.6	0.6	989	827	908	3	2.7	2.85	836	805	820.5	
					0			0	Level 4	0.7	0.6	0.65	1268	1408	1338	1	1.1	1.05	699	630	664.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
19	29	M	116	118	117	14.1	13.6	13.85	Level 1	2.7	3	2.85	1148	1329	1238.5	5.6	6.2	5.9	660	542	601	
					0			0	Level 2	0.7	0.7	0.7	1368	1505	1436.5	3.4	3.3	3.35	705	869	787	ABSENT

					0			0	Level 3	0.7	0.5	0.6	1014	1332	1173	2.6	3	2.8	1056	1058	1057	
					0			0	Level 4	0.8	0.5	0.65	1103	910	1006.5	1.5	1.4	1.45	1698	1719	1708.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
20	26	M	116	114	115	11.5	11.7	11.6	Level 1	1	0.9	0.95	1055	1069	1062	9.8	9.7	9.75	826	882	854	
					0			0	Level 2	0.9	0.8	0.85	1268	1186	1227	5.3	4.9	5.1	729	623	676	ABSENT
					0			0	Level 3	0.8	0.7	0.75	1127	1030	1078.5	3.1	3.1	3.1	1039	1199	1119	
					0			0	Level 4	0.7	0.5	0.6	725	737	731	1.1	1.2	1.15	1312	1375	1343.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
21	23	M	120	118	119	13.9	13.7	13.8	Level 1	2.5	2	2.25	1151	1612	1381.5	10.3	1.3	5.8	531	467	499	
					0			0	Level 2	0.6	0.6	0.6	657	1008	832.5	7.3	7	7.15	445	408	426.5	ABSENT
					0			0	Level 3	0.9	0.6	0.75	766	849	807.5	4.6	4.5	4.55	648	641	644.5	
					0			0	Level 4	1.6	1.4	1.5	1029	931	980	2.7	1.7	2.2	1341	1331	1336	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
22	32	F	119	121	120	12.7	12.4	12.55	Level 1	1.7	1.5	1.6	1932	2260	2096	6.2	6.2	6.2	624	571	597.5	
					0			0	Level 2	0.7	0.5	0.6	1267	1133	1200	3.4	3.1	3.25	1522	1530	1526	ABSENT
					0			0	Level 3	0.6	0.4	0.5	1233	1136	1184.5	3	2.5	2.75	1688	1732	1710	
					0			0	Level 4	1.1	1.1	1.1	1139	1066	1102.5	1.8	1.4	1.6	1822	1804	1813	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
23	29	F	120	118	119	12.8	13.1	12.95	Level 1	2.9	3	2.95	760	791	775.5	5.6	6	5.8	1093	1137	1115	
					0			0	Level 2	1.1	1	1.05	1331	1452	1391.5	2.8	2.9	2.85	1068	1032	1050	ABSENT
					0			0	Level 3	0.7	0.5	0.6	864	965	914.5	2.1	2.3	2.2	930	1009	969.5	
					0			0	Level 4	0.6	0.5	0.55	766	959	862.5	0.9	1	0.95	1436	1339	1387.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
24	23	F	118	116	117	12.9	13.3	13.1	Level 1	3.6	4	3.8	995	825	910	6.4	5.9	6.15	1409	1358	1383.5	
					0			0	Level 2	1.1	0.9	1	1557	1474	1515.5	3.1	2.8	2.95	603	739	671	ABSENT
					0			0	Level 3	0.5	0.4	0.45	1242	1324	1283	1.4	1.5	1.45	1735	1720	1727.5	
					0			0	Level 4	0.5	0.4	0.45	774	774	774	1	0.8	0.9	1462	1315	1388.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0	0		0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
25	31	F	119	117	118	12.1	12.5	12.3	Level 1	2.3	2	2.15	1581	1546	1563.5	6.2	6.5	6.35	577	501	539	
					0			0	Level 2	0.5	0.3	0.4	1196	1254	1225	2.9	3.2	3.05	1134	944	1039	ABSENT
					0			0	Level 3	0.5	0.4	0.45	871	908	889.5	1.6	1.6	1.6	1604	1860	1732	
					0			0	Level 4	0.4	0.4	0.4	1067	1067	1067	0.9	0.7	0.8	1410	1435	1422.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
26	31	M	121	119	120	13.4	13.6	13.5	Level 1	3.2	2.7	2.95	1450	1418	1434	7.8	7.8	7.8	454	484	469	
					0			0	Level 2	0.6	0.4	0.5	1282	1030	1156	4	4.1	4.05	812	782	797	ABSENT
					0			0	Level 3	0.5	0.4	0.45	1358	1098	1228	2.6	2.4	2.5	1245	1243	1244	
					0			0	Level 4	0.9	0.7	0.8	834	687	760.5	1.1	1.3	1.2	1257	1360	1308.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
27	25	M	120	117	118.5	12	12.3	12.15	Level 1	2.7	2.98	2.84	1767	1901	1834	4.9	4.7	4.8	974	908	941	
					0			0	Level 2	0	0	0	0	0	0	2	2	2	1623	1618	1620.5	FENESTRATION
					0			0	Level 3	0.2	0.2	0.2	607	882	744.5	0.9	0.7	0.8	1642	1581	1611.5	
					0			0	Level 4	0.4	0.4	0.4	1105	951	1028	0.4	0.4	0.4	1416	1527	1471.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
28	26	F	114	117	115.5	12.5	12.3	12.4	Level 1	1.6	1.5	1.55	1606	1530	1568	6.5	6.1	6.3	583	580	581.5	
					0			0	Level 2	0.8	0.4	0.6	1253	1072	1162.5	3	2.9	2.95	787	765	776	
					0			0	Level 3	0	0	0	0	0	0	2.1	1.9	2	1431	1417	1424	FENESTRATION
					0			0	Level 4	0.6	0.4	0.5	1150	1173	1161.5	1	0.9	0.95	1304	1224	1264	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	

29	29	M	119	114	116.5	12	12.1	12.05	Level 1	4.1	4	4.05	1015	889	952	8.1	8.3	8.2	414	445	429.5	
					0			0	Level 2	1.4	1.3	1.35	1429	1472	1450.5	5.7	5.3	5.5	607	497	552	ABSENT
					0			0	Level 3	0.6	0.5	0.55	884	626	755	3.5	4	3.75	767	731	749	
					0			0	Level 4	0.7	0.6	0.65	1175	1239	1207	2.1	2	2.05	1174	1250	1212	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
30	26	M	112	113	112.5	13.7	13.8	13.75	Level 1	2.1	2.3	2.2	1489	1353	1421	11.9	11.9	11.9	456	325	390.5	
					0			0	Level 2	1	0.9	0.95	1626	1763	1694.5	7.6	7.6	7.6	641	604	622.5	ABSENT
					0			0	Level 3	0.8	0.7	0.75	1038	1043	1040.5	4.9	4.8	4.85	706	838	772	
					0			0	Level 4	0.5	0.5	0.5	941	1026	983.5	1.6	2.2	1.9	1513	1330	1421.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
31	26	M	114	115	114.5	13.9	13.6	13.75	Level 1	2.2	2.5	2.35	1029	1139	1084	10.2	11.1	10.65	529	644	586.5	
					0			0	Level 2	0.8	0.7	0.75	1447	1349	1398	7.9	7.3	7.6	546	597	571.5	ABSENT
					0			0	Level 3	0.5	0.7	0.6	1554	1538	1546	4.6	4.7	4.65	865	929	897	
					0			0	Level 4	0.5	0.5	0.5	1072	1129	1100.5	2.5	2.8	2.65	1448	1479	1463.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
32	34	M	117	119	118	15.5	15.2	15.35	Level 1	2.1	2	2.05	1664	1451	1557.5	8.5	8.6	8.55	737	777	757	
					0			0	Level 2	0.6	0.5	0.55	769	1086	927.5	4.8	4.3	4.55	979	1097	1038	ABSENT
					0			0	Level 3	0.5	0.5	0.5	497	696	596.5	2.7	2.7	2.7	924	866	895	
					0			0	Level 4	0.5	0.5	0.5	860	1009	934.5	1.2	0.8	1	1370	1260	1315	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
33	32	M	114	112	113	12.4	12.2	12.3	Level 1	2	1.8	1.9	1528	1481	1504.5	8	7.7	7.85	534	437	485.5	
					0			0	Level 2	0.6	0.5	0.55	1579	1622	1600.5	4.3	3.8	4.05	973	954	963.5	DEHISCENCE
					0			0	Level 3	0.5	0.5	0.5	1266	1184	1225	2.6	2.6	2.6	1657	1647	1652	
					0			0	Level 4	0	0	0	0	0	0	1.4	1.3	1.35	1552	1536	1544	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
34	32	M	115	117	116	13.2	13.4	13.3	Level 1	1.8	1.8	1.8	1745	1733	1739	7.7	8	7.85	775	850	812.5	
					0			0	Level 2	0.5	0.5	0.5	1639	1642	1640.5	4.4	4.3	4.35	1562	1684	1623	ABSENT
					0			0	Level 3	0.2	0.2	0.2	1289	1347	1318	2.6	2.4	2.5	1703	1665	1684	
					0			0	Level 4	0	0	0	0	0	0	1.5	1.3	1.4	1552	1665	1608.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
35	37	F	114	115	114.5	13.7	13.7	13.7	Level 1	1.7	1.4	1.55	1339	1333	1336	5	4.6	4.8	385	508	446.5	
					0			0	Level 2	0.6	4	2.3	980	825	902.5	3.1	3.1	3.1	809	779	794	
					0			0	Level 3	0	0	0	0	0	0	2.2	2.4	2.3	1464	1410	1437	FENESTRATION
					0			0	Level 4	0.6	0.6	0.6	774		387	1.1	1.4	1.25	1276	1291	1283.5	
					0			0	Level 5	0	0	0	0	754	377	0	0	0	0	0	0	
					0			0				0		0	0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
36	28	F	121	120	120.5	13.5	13.6	13.55	Level 1	2.6	2.3	2.45	1325	1235	1280	6.9	6.7	6.8	522	626	574	
					0			0	Level 2	0.8	0.9	0.85	1197	1256	1226.5	5.2	5.2	5.2	589	542	565.5	ABSENT
					0			0	Level 3	0.7	0.4	0.55	984	802	893	4.7	4.8	4.75	1388	1353	1370.5	
					0			0	Level 4	0.7	0.5	0.6	696	769	732.5	1.6	1	1.3	944	1016	980	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
37	29	F	118	117	117.5	10.6	10.8	10.7	Level 1	3.1	2.8	2.95	1492	1511	1501.5	6.1	5.8	5.95	875	894	884.5	
					0			0	Level 2	1.3	1.1	1.2	1683	1725	1704	3.6	3	3.3	531	617	574	ABSENT
					0			0	Level 3	0.8	7	3.9	1405	1545	1475	3.9	2.3	3.1	1174	1063	1118.5	
					0			0	Level 4	0.9	0.8	0.85	1167	1072	1119.5	0.9	1	0.95	1550	1237	1393.5	
					0			0	Level 5	0	0	0	0	0	0	0.9	0	0.45	0	0	0	
					0			0				0			0	0		0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
38	19	M	120	119	119.5	13	13.3	13.15	Level 1	2.9	2.8	2.85	1705	1670	1687.5	7	6.7	6.85	780	784	782	
					0			0	Level 2	1.4	1.3	1.35	1830	1823	1826.5	4.9	4.7	4.8	1122	1159	1140.5	ABSENT
					0			0	Level 3	1	1	1	1055	1170	1112.5	3.1	3.1	3.1	1437	1406	1421.5	
					0			0	Level 4	0.8	0.8	0.8	1321	1172	1246.5	0	0	0	0	0	0	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
39	18	F	120	120	120	12.1	11.9	12	Level 1	2.3	2	2.15	1198	1197	1197.5	6.4	6.4	6.4	851	809	830	
					0			0	Level 2	1.2	0.7	0.95	1414	1121	1267.5	4.4	4.1	4.25	944	1083	1013.5	ABSENT
					0			0	Level 3	0.6	0.6	0.6	1281	1197	1239	2.8	2.3	2.55	869	938	903.5	
					0			0	Level 4	0.5	0.5	0.5	1088	1123	1105.5	1.3	1.2	1.25	1505	1551	1528	

					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
40	31	F	118	121	119.5	12.8	12.7	12.75	Level 1	1.1	1.5	1.3	1911	1947	1929	6.3	6.4	6.35	762	700	731	
					0			0	Level 2	0.4	0.4	0.4	1665	1721	1693	3.5	3.7	3.6	1357	1380	1368.5	ABSENT
					0			0	Level 3	0.6	0.7	0.65	1264	1261	1262.5	2.8	3.3	3.05	777	778	777.5	
					0			0	Level 4	0.4	0.7	0.55	992	1108	1050	1.4	0.9	1.15	1817	1820	1818.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
41	21	F	119	118	118.5	13.5	13.6	13.55	Level 1	1.6	1.9	1.75	1556	1431	1493.5	7.6	7.2	7.4	712	763	737.5	
					0			0	Level 2	0.9	0.7	0.8	1081	1120	1100.5	3.6	3.5	3.55	966	1062	1014	ABSENT
					0			0	Level 3	0.5	0.5	0.5	929	1061	995	2.3	2.7	2.5	939	1083	1011	
					0			0	Level 4	1.2	1.1	1.15	1527	1538	1532.5	1.9	1.7	1.8	1321	1483	1402	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
42	24	F	118	115	116.5	11.7	11.3	11.5	Level 1	0	0	0	0	0	0	5.5	5.4	5.45	639	586	612.5	FENESTRATION
					0			0	Level 2	0	0	0	0	0	0	2.2	2	2.1	1487	1346	1416.5	
					0			0	Level 3	0.8	0.8	0.8	1557	1612	1584.5	0.9	0.6	0.75	1547	1762	1654.5	
					0			0	Level 4	0.9	0.9	0.9	1381	1179	1280	0.7	0.7	0.7	1510	1439	1474.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
43	27	F	115	118	116.5	13	13.2	13.1	Level 1	2.3	2.3	2.3	1746	1745	1745.5	4.7	4.7	4.7	460	642	551	
					0			0	Level 2	0.6	0.4	0.5	1715	1560	1637.5	4.5	1.5	3	1513	1534	1523.5	ABSENT
					0			0	Level 3	0.6	0.4	0.5	1595	1406	1500.5	1.5	1.2	1.35	1618	1560	1589	
					0			0	Level 4	0.7	0.5	0.6	1673	1650	1661.5	1.1	1	1.05	1450	1364	1407	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
44	18	M	112	11	61.5	13.2	13.1	13.15	Level 1	1.8	1.6	1.7	1879	2026	1952.5	8.6	9.3	8.95	1298	1295	1296.5	
					0			0	Level 2	0.7	0.6	0.65	1422	1491	1456.5	4.7	4.7	4.7	1351	1486	1418.5	ABSENT
					0			0	Level 3	0.5	0.6	0.55	1297	1663	1480	3.6	3.8	3.7	609	744	676.5	
					0			0	Level 4	0.8	0.7	0.75	1004	1094	1049	2	2	2	1552	1647	1599.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
45	32	F	119	115	117	12.1	12.2	12.15	Level 1	0.7	0.8	0.75	1246	1198	1222	7.87	7.6	7.735	643	634	638.5	
					0			0	Level 2	0	0	0	0	0	0	4.6	4.1	4.35	697	697	697	FENESTRATION
					0			0	Level 3	0	0	0	0	0	0	3.3	3.1	3.2	837	963	900	
					0			0	Level 4	0.5	0.6	0.55	941	1071	1006	2	2	2	1342	1332	1337	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
46	29	F	115	117	116	10.7	10.8	10.75	Level 1	1.9	1.6	1.75	1893	1831	1862	4.9	4.9	4.9	969	952	960.5	
					0			0	Level 2	1.4	0.9	1.15	1656	1822	1739	3.5	3.2	3.35	951	965	958	ABSENT
					0			0	Level 3	0.9	0.7	0.8	1668	1726	1697	3.1	1.7	2.4	1561	1619	1590	
					0			0	Level 4	0.7	0.6	0.65	1223	1327	1275	0.4	0.4	0.4	1173	1699	1436	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
47	25	F	116	119	117.5	12.5	124	68.25	Level 1	2.6	2.8	2.7	1509	1529	1519	8.9	8.9	8.9	702	609	655.5	
					0			0	Level 2	1	1	1	1493	1488	1490.5	6.2	6.2	6.2	1196	1256	1226	ABSENT
					0			0	Level 3	0.6	0.5	0.55	1424	1496	1460	4.4	4.7	4.55	1146	1067	1106.5	
					0			0	Level 4	0.5	0.5	0.5	1393	1265	1329	2.5	2.5	2.5	1466	1418	1442	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
48	28	F	118	120	119	13.7	13.9	13.8	Level 1	1.5	1.1	1.3	853	925	889	7.9	8.8	8.35	859	822	840.5	
					0			0	Level 2	0.6	0.5	0.55	1037	887	962	5.6	5.3	5.45	1230	1272	1251	
					0			0	Level 3	0	0	0	0	0	0	3.7	4	3.85	0	0	0	FENESTRATION
					0			0	Level 4	0.5	0.5	0.5	605	686	645.5	0	0	0	0	0	0	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
49	29	F	120	115	117.5	11.5	11.4	11.45	Level 1	2.8	3.2	3	970	921	945.5	5.9	6	5.95	797	876	836.5	
					0			0	Level 2	0.8	0.8	0.8	1742	1708	1725	3.6	3.6	3.6	625	722	673.5	ABSENT
					0			0	Level 3	0.7	0.6	0.65	1493	1560	1526.5	2.9	2.4	2.65	1541	1502	1521.5	

					0			0	Level 4	0.7	0.7	0.7	1289	1213	1251	0.6	0.7	0.65	1355	1334	1344.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
50	26	F	118	119	118.5	11.8	12.1	11.95	Level 1	0.7	1	0.85	937	925	931	6.7	6.9	6.8	650	546	598	
					0			0	Level 2	0	0	0	0	0	0	4	3.7	3.85	482	369	425.5	
					0			0	Level 3	0	0	0	0	0	0	2.7	2.5	2.6	904	874	889	FENESTRATION
					0			0	Level 4	1.1	1.4	1.25	1360	1250	1305	1.1	1.7	1.4	1464	1425	1444.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	

Group-3

Sr. No	Age	Sex	Angle of Inclination 1	Angle of Inclination 2	Avgerage Angle of Inclination	Root Length 1	Root Length 2	Average Root length	Alveolar Bone Thickness Levels	Labial Thickness 1	Labial Thickness 2	Average Libal Thickness	Gray Scale value 1	Gray Scale value 2	Avgerage Gray Ssacle valur	Lingual Thickness 1	Lingual Thickness 2	Average Lingual Thickness	Gray Scale value 1	Gray Scale value 2	Average gray scale value	FENESTRATION OR DEHISCENCE
1	27	M	130	131	130.5	13	13.2	13.1	Level 1	2.3	2.3	2.3	1876	1776	1826	8.4	8.7	8.55	728	309	518.5	
					0			0	Level 2	0.9	0.8	0.85	1390	1363	1376.5	5.8	6	5.9	562	672	617	ABSENT
					0			0	Level 3	0.8	0.8	0.8	1206	1298	1252	4.4	4.5	4.45	1175	786	980.5	
					0			0	Level 4	0.8	0.8	0.8	995	1342	1168.5	2.8	2.8	2.8	1725	1765	1745	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
2	19	M	128	127	127.5	12.3	12.3	12.3	Level 1	2.6	2.7	2.65	1225	1121	1173	8.7	9.2	8.95	750	851	800.5	
					0			0	Level 2	0.8	0.8	0.8	1319	1275	1297	5.2	5	5.1	822	924	873	ABSENT
					0			0	Level 3	0.7	0.8	0.75	829	782	805.5	2.9	2.8	2.85	1209	1286	1247.5	
					0			0	Level 4	0.7	0.7	0.7	902	765	833.5	1.7	1.8	1.75	1534	1421	1477.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
3	23	M	129	128	128.5	13.8	14	13.9	Level 1	2	1.9	1.95	1225	1303	1264	7.8	7.3	7.55	500	626	563	
					0			0	Level 2	0.9	0.8	0.85	1298	1110	1204	4.2	4.4	4.3	526	536	531	ABSENT
					0			0	Level 3	0.7	0.5	0.6	1298	1066	1182	3	2.9	2.95	1300	1320	1310	
					0			0	Level 4	0.4	0.3	0.35	1021	813	917	1.3	1	1.15	1145	1221	1183	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
4	27	M	122	122	122	15.3	15	15.15	Level 1	2.1	2.3	2.2	1418	1636	1527	13.1	13.3	13.2	539	598	568.5	
					1			0	Level 2	8.8	0.9	4.85	1112	1392	1252	8.6	8.7	8.65	580	524	552	ABSENT
					0			0	Level 3	0.7	0.7	0.7	1125	919	1022	5.2	5.6	5.4	705	767	736	
					0			0	Level 4	0.8	0.9	0.85	1135	1234	1184.5	3.6	3.7	3.65	919	852	885.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
5	22	M	137	135	136	15.4	15.5	15.45	Level 1	2.3	2.1	2.2	698	666	682	6	6.4	6.2	564	631	597.5	
					0			0	Level 2	0.8	9	4.9	1026	1032	1029	3.6	3.7	3.65	485	443	464	
					0			0	Level 3	0	0	0	0	0	0	1.9	1.9	1.9	984	879	931.5	
					0			0	Level 4	0	0	0	0	0	0	9	1	5	1105	1145	1125	DEHISCENCE
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
6	28	M	126	129	127.5	12.5	12.4	12.45	Level 1	2	1.8	1.9	1401	1499	1450	10.6	10.5	10.55	510	464	487	
					0			0	Level 2	0.6	0.5	0.55	1133	1322	1227.5	7.1	6.9	7	487	463	475	ABSENT
					0			0	Level 3	0.6	0.6	0.6	997	997	997	5	5	5	533	598	565.5	
					0			0	Level 4	1.3	1.3	1.3	1260	1282	1271	2.9	2.9	2.9	1139	1335	1237	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
7	27	F	129	127	128	11.5	11	11.25	Level 1	3	3.1	3.05	1867	1943	1905	3.5	3.8	3.65	433	675	554	
					0			0	Level 2	0	0	0	0	0	0	1.4	1.3	1.35	1567	1787	1677	FENESTRATION
					0			0	Level 3	0	0	0	0	0	0	0.9	0.8	0.85	1683	1547	1615	
					0			0	Level 4	0.7	0.9	0.8	1206	951	1078.5	0.5	0.7	0.6	1366	1540	1453	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
8	19	M	132	130	131	16.1	16.2	16.15	Level 1	7.5	8.8	8.15	768	843	805.5	7.6	7.8	7.7	470	495	482.5	
					0			0	Level 2	3.5	3.7	3.6	778	935	856.5	5.5	4.8	5.15	707	678	692.5	ABSENT
					0			0	Level 3	1.4	1.3	1.35	1718	1813	1765.5	4.6	3.5	4.05	686	717	701.5	
					0			0	Level 4	0.5	0.5	0.5	876	1017	946.5	3.2	2.9	3.05	668	712	690	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
9	32	F	122	123	122.5	10.6	10.2	10.4	Level 1	4.3	5.1	4.7	1014	1130	1072	5	5.1	5.05	505	664	584.5	
					0			0	Level 2	1.7	1.3	1.5	1164	1134	1149	3.6	3.8	3.7	1015	921	968	ABSENT
					0			0	Level 3	0.9	0.6	0.75	1044	970	1007	3.3	2.4	2.85	1186	1066	1126	
					0			0	Level 4	0.9	0.6	0.75	807	898	852.5	2.6	1.1	1.85	1012	1071	1041.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
10	30	M	128	130	129	13	13.3	13.15	Level 1	1.8	1.6	1.7	1852	1833	1842.5	8.2	8.8	8.5	727	756	741.5	
					0			0	Level 2	0.5	0.5	0.5	1185	1023	1104	5.2	4.9	5.05	712	640	676	ABSENT
					0			0	Level 3	0.5	0.5	0.5	1283	1313	1298	3.5	2.9	3.2	968	930	949	
					0			0	Level 4	0.3	0.3	0.3	563	521	542	1	1	1	1778	1627	1702.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
11	28	M	125	128	126.5	11.8	11.6	11.7	Level 1	2.2	1.6	1.9	1491	1375	1433	6.4	6.6	6.5	833	873	853	

					0			0	Level 2	1.3	0.6	0.95	1694	1349	1521.5	3.7	3.2	3.45	904	998	951	ABSENT
					0			0	Level 3	1.1	0.9	1	1509	1510	1509.5	1.8	1.8	1.8	1360	1381	1370.5	
					0			0	Level 4	0.9	0.7	0.8	1363	1387	1375	0.7	7	3.85	1270	1360	1315	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
12	26	F	126	124	125	12.9	13	12.95	Level 1	2.4	2.8	2.6	1161	1511	1336	7.8	7.8	7.8	392	331	361.5	
					0			0	Level 2	1.1	0.8	0.95	1362	1486	1424	5.2	4.9	5.05	831	862	846.5	ABSENT
					0			0	Level 3	1.2	0.9	1.05	1731	1764	1747.5	3.7	3.5	3.6	1503	1630	1566.5	
					0			0	Level 4	2	1.7	1.85	1673	1735	1704	1.7	1.6	1.65	1426	1310	1368	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
13	19	F	129	126	127.5	13.2	13	13.1	Level 1	1.7	1.4	1.55	1314	1301	1307.5	4.3	3.7	4	568	502	535	
					0			0	Level 2	0.9	0.6	0.75	1199	1064	1131.5	2.2	2.1	2.15	1251	1206	1228.5	ABSENT
					0			0	Level 3	0.5	0.4	0.45	852	1197	1024.5	1.5	1.3	1.4	1631	1651	1641	
					0			0	Level 4	0.7	0.6	0.65	988	917	952.5	1.1	0.9	1	1466	1429	1447.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
14	18	M	129	124	126.5	12.7	12.6	12.65	Level 1	2.4	2.1	2.25	1432	1456	1444	7.7	7.7	7.7	380	339	359.5	
					0			0	Level 2	0.8	0.5	0.65	934	1055	994.5	4.2	4	4.1	580	529	554.5	ABSENT
					0			0	Level 3	0.7	0.4	0.55	1193	1043	1118	2.9	2.9	2.9	1086	1042	1064	
					0			0	Level 4	0.8	0.7	0.75	1344	1425	1384.5	1.4	0.8	1.1	1235	1300	1267.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
15	30	M	124	123	123.5	11.2	11.3	11.25	Level 1	3	3	3	1399	1317	1358	5.5	5.5	5.5	553	593	573	
					0			0	Level 2	0.9	1	0.95	1422	1540	1481	2.9	2.7	2.8	1197	1205	1201	ABSENT
					0			0	Level 3	0.8	0.7	0.75	1637	1683	1660	1.1	0.9	1	1341	1238	1289.5	
					0			0	Level 4	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0	Level 5	0	0	0		0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
16	25	F	124	127	125.5	13.4	13.6	13.5	Level 1	2.5	2.3	2.4	2042	1912	1977	6.1	6.1	6.1	354	333	343.5	
					0			0	Level 2	1	0.9	0.95	1576	1531	1553.5	3.9	3.7	3.8	958	1116	1037	ABSENT
					0			0	Level 3	0.7	0.6	0.65	1204	1351	1277.5	2.7	2.7	2.7	1489	1433	1461	
					0			0	Level 4	10	0.8	5.4	1508	1550	1529	2.1	2.1	2.1	1762	1617	1689.5	
					0			0	Level 5		0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
17	28	M	125	128	126.5	15.4	15.6	15.5	Level 1	2.3	2.1	2.2	1524	1482	1503	6.1	6.3	6.2	421	543	482	
					0			0	Level 2	0.8	0.7	0.75	1363	1459	1411	3.5	3.2	3.35	943	1040	991.5	ABSENT
					0			0	Level 3	0.8	0.7	0.75	1238	1400	1319	2.8	2.5	2.65	1488	1523	1505.5	
					0			0	Level 4	0.9	0.8	0.85	1120	1116	1118	1.6	1.4	1.5	1412	1341	1376.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
18	36	F	122	127	124.5	11.9	12	11.95	Level 1	1.6	1.5	1.55	1480	1419	1449.5	6.2	6.4	6.3	726	828	777	
					0			0	Level 2	0.7	0.6	0.65	1070	1265	1167.5	3.6	3.3	3.45	791	867	829	ABSENT
					0			0	Level 3	0.7	0.5	0.6	1009	1190	1099.5	1.8	1.8	1.8	1112	831	971.5	
					0			0	Level 4	0.7	0.5	0.6	1088	1173	1130.5	0.9	0.9	0.9	1410	1542	1476	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
19	28	M	123	124	123.5	15.9	15.7	15.8	Level 1	2.1	1.9	2	840	906	873	8.2	8.1	8.15	271	204	237.5	
					0		0	0	Level 2	0.7	0.6	0.65	785	713	749	4.8	4.9	4.85	465	456	460.5	ABSENT
					0			0	Level 3	0.9	0.6	0.75	600	519	559.5	2.6	2.4	2.5	649	664	656.5	
					0			0	Level 4	0.2	0	0.1	312	0	156	0.9	0.5	0.7	801	655	728	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
20	33	M	125	127	126	12.4	12.3	12.35	Level 1	6.3	6.1	6.2	1207	1227	1217	9	9.5	9.25	465	492	478.5	
					0			0	Level 2	0.9	0.9	0.9	1346	1478	1412	5.7	5	5.35	516	452	484	ABSENT
					0			0	Level 3	0.5	0.5	0.5	921	726	823.5	3.1	3.1	3.1	936	961	948.5	
					0			0	Level 4	0.6	0.7	0.65	698	634	666	1	0.9	0.95	1351	1369	1360	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
21	35	M	128	126	127	13	13.1	13.05	Level 1	2.7	2.5	2.6	1264	1157	1210.5	5.8	6	5.9	1093	1114	1103.5	
					0			0	Level 2	1	0.9	0.95	1329	1547	1438	3.2	3.4	3.3	861	801	831	ABSENT
					0			0	Level 3	0.7	0.5	0.6	878	889	883.5	2.3	24	13.15	894	961	927.5	

					0			0	Level 4	1	0.7	0.85	1202	1053	1127.5	1.1	1	1.05	1062	1034	1048	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
22	28	M	123	129	126	14.2	14.1	14.15	Level 1	2.2	1.8	2	1619	1555	1587	6.1	6.1	6.1	975	685	830	
					0			0	Level 2	0.7	0.6	0.65	932	1084	1008	4.1	4	4.05	1138	1070	1104	
					0			0	Level 3	0	0	0	0	0	0	2.2	2.3	2.25	1188	1205	1196.5	FENESTRATION
					0			0	Level 4	0.8	0.6	0.7	917	1180	1048.5	0.8	0.7	0.75	1371	1289	1330	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
23	26	M	128	125	126.5	13.5	13.3	13.4	Level 1	4	3.6	3.8	1528	1681	1604.5	7.7	7.2	7.45	908	826	867	
					0			0	Level 2	1	0.9	0.95	1610	1545	1577.5	5.1	4.8	4.95	1033	1044	1038.5	ABSENT
					0			0	Level 3	0.8	0.8	0.8	1558	1751	1654.5	3.5	3.4	3.45	1017	951	984	
					0			0	Level 4	0.9	0.5	0.7	1561	1469	1515	1.7	1.2	1.45	1660	1633	1646.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
24	38	M	125	122	123.5	12.8	13	12.9	Level 1	2.6	2.4	2.5	1969	1924	1946.5	5.7	5.3	5.5	1619	1166	1392.5	
					0			0	Level 2	0.9	0.9	0.9	1596	1621	1608.5	3.8	4.1	3.95	1299	1205	1252	DEHISCENCE
					0			0	Level 3	1	0.8	0.9	725	919	822	2.9	2.8	2.85	1521	1515	1518	
					0			0	Level 4	0	0	0	0	0	0	1.3	1	1.15	1678	1717	1697.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
25	32	M	124	123	123.5	14.3	14.4	14.35	Level 1	3.1	3.1	3.1	1073	1064	1068.5	5.7	5.7	5.7	749	734	741.5	
					0			0	Level 2	1.2	0.8	1	1527	1411	1469	3.4	2.8	3.1	693	611	652	ABSENT
					0			0	Level 3	0.8	0.6	0.7	1169	1241	1205	2.5	2.4	2.45	1059	1104	1081.5	
					0			0	Level 4	0.9	0.7	0.8	1208	1295	1251.5	0.8	1.7	1.25	1667	1697	1682	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
26	27	F	126	129	127.5	10.7	10.4	10.55	Level 1	1.8	1.5	1.65	1808	1604	1706	4.4	4.7	4.55	513	497	505	
					0			0	Level 2	0.8	0.5	0.65	1593	1354	1473.5	2.6	2.4	2.5	1494	1506	1500	ABSENT
					0			0	Level 3	0.8	0.5	0.65	787	753	770	1.8	1.5	1.65	1391	1477	1434	
					0			0	Level 4	0.8	0.6	0.7	1445	1315	1380	1.4	1.2	1.3	1296	1284	1290	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0	0		0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
27	32	M	140	139	139.5	14.7	14.5	14.6	Level 1	7.4	7.9	7.65	1009	1133	1071	5.6	5.8	5.7	333	388	360.5	
					0			0	Level 2	2.2	1.7	1.95	1455	1506	1480.5	3.2	3.2	3.2	876	711	793.5	ABSENT
					0			0	Level 3	1.1	0.7	0.9	1342	1471	1406.5	2.7	2.6	2.65	1063	1214	1138.5	
					0			0	Level 4	0.6	0.4	0.5	955	1132	1043.5	1.8	1.6	1.7	1039	1066	1052.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
28	19	M	123	124	123.5	14.9	14.5	14.7	Level 1	2.2	2	2.1	1844	1735	1789.5	7.3	6.8	7.05	569	652	610.5	
					0			0	Level 2	0.7	0.7	0.7	1478	1606	1542	4.1	4.1	4.1	1035	1062	1048.5	ABSENT
					0			0	Level 3	0.5	0.4	0.45	750	608	679	3	3	3	1519	1495	1507	
					0			0	Level 4	0.5	0.5	0.5	1307	1194	1250.5	1.1	1.1	1.1	1292	1350	1321	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
29	19	M	126	128	127	14.5	14.4	14.45	Level 1	1.2	1.2	1.2	1456	1577	1516.5	6.7	6.4	6.55	653	550	601.5	
					0			0	Level 2	0.4	0.4	0.4	1184	978	1081	3.6	4.1	3.85	754	848	801	ABSENT
					0			0	Level 3	0.5	0.5	0.5	1048	1187	1117.5	2.2	2.5	2.35	940	1109	1024.5	
					0			0	Level 4	0.6	0.6	0.6	1352	1115	1233.5	1.2	0.9	1.05	1390	1142	1266	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
30	22	F	131	132	131.5	11.3	11.2	11.25	Level 1	2.6	2.4	2.5	1257	1177	1217	5.3	5.4	5.35	942	879	910.5	
					0			0	Level 2	0.7	0.6	0.65	1243	1194	1218.5	3.2	2.9	3.05	1024	1031	1027.5	ABSENT
					0			0	Level 3	0.6	0.6	0.6	952	974	963	2.2	2.1	2.15	1428	1461	1444.5	
					0			0	Level 4	0.6	0.6	0.6	1026	1036	1031	1.1	1.1	1.1	1431	1410	1420.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
31	27	F	125	124	124.5	14.4	14.3	14.35	Level 1	2.6	2.4	2.5	1812	1874	1843	4.8	4.8	4.8	673	710	691.5	
					0			0	Level 2	1	0.8	0.9	1594	1441	1517.5	2.3	2	2.15	1875	1863	1869	DEHISCENCE

					0			0	Level 3	0	0	0	0	0	0	1.6	1.5	1.55	2074	2036	2055	
					0			0	Level 4	0	0	0	0	0	0	1.1	1	1.05	1931	1974	1952.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
32	31	F	124	126	125	14.4	14.3	14.35	Level 1	1.7	1.5	1.6	1626	1731	1678.5	5.4	5.5	5.45	541	572	556.5	
					0			0	Level 2	0.2	0.3	0.25	1006	1155	1080.5	2.3	2.2	2.25	1724	1674	1699	
					0			0	Level 3	0	0	0	0	0	0	2.4	1.4	1.9	1940	1826	1883	DEHISCENCE
					0			0	Level 4	0	0	0	0	0	0	1.1	0.9	1	1748	1636	1692	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
33	31	F	122	125	123.5	13.7	13.7	13.7	Level 1	2.5	2.2	2.35	937	908	922.5	6.2	6.3	6.25	400	444	422	
					0			0	Level 2	0.8	0.6	0.7	1177	1363	1270	2.6	3.3	2.95	740	762	751	
					0			0	Level 3	0	0	0	0	0	0	1.8	1.9	1.85	565	603	584	FENESTRATION
					0			0	Level 4	0.7	0.5	0.6	886	1049	967.5	1	1	1	1715	1757	1736	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
34	20	F	125	122	123.5	11.5	114	62.75	Level 1	4.6	4.3	4.45	801	865	833	5.5	5.3	5.4	550	588	569	
					0			0	Level 2	1.3	1.1	1.2	1638	1695	1666.5	3	3	3	827	984	905.5	ABSENT
					0			0	Level 3	0.6	0.5	0.55	1452	1444	1448	1.7	1.8	1.75	1419	1519	1469	
					0			0	Level 4	0.7	0.7	0.7	1659	1570	1614.5	1.3	1.3	1.3	1602	1552	1577	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
35	35	F	123	123	123	12.6	12.5	12.55	Level 1	3.6	3.6	3.6	885	844	864.5	5.5	4.9	5.2	529	459	494	
					0			0	Level 2	1	1.2	1.1	2112	2256	2184	2.9	2.8	2.85	1488	1661	1574.5	ABSENT
					0			0	Level 3	1.2	1	1.1	1789	1909	1849	2	1.9	1.95	1776	1682	1729	
					0			0	Level 4	0.6	0.6	0.6	826	816	821	0.4	0.4	0.4	1667	1505	1586	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
36	19	F	131	128	129.5	11	11.2	11.1	Level 1	5	5.2	5.1	968	1008	988	4.8	4.6	4.7	1227	1306	1266.5	
					0			0	Level 2	2.1	2.1	2.1	1145	1192	1168.5	2.7	2.7	2.7	1342	1446	1394	ABSENT
					0			0	Level 3	1	0.7	0.85	1362	1377	1369.5	2.5	2.1	2.3	1188	1178	1183	
					0			0	Level 4	1	0.9	0.95	1129	1097	1113	2	1.9	1.95	1131	1100	1115.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
37	22	F	125	128	126.5	11.7	11.5	11.6	Level 1	3.3	2.7	3	1479	1339	1409	4.2	4.5	4.35	567	438	502.5	
					0			0	Level 2	1.3	1.3	1.3	1341	1485	1413	2.2	1.9	2.05	1433	1451	1442	ABSENT
					0			0	Level 3	0.6	0.6	0.6	911	945	928	1.6	1.3	1.45	1379	1432	1405.5	
					0			0	Level 4	1	0.8	0.9	916	1080	998	1.5	1.5	1.5	1389	1396	1392.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
38	19	M	138	131	134.5	14.6	14.7	14.65	Level 1	3.5	3.3	3.4	1512	1418	1465	6.3	6.7	6.5	1437	1406	1421.5	
					0			0	Level 2	0.9	0.9	0.9	1641	1408	1524.5	2.9	2.8	2.85	1531	1559	1545	
					0			0	Level 3	0	0	0	0	0	0	1	1.1	1.05	1175	1210	1192.5	FENESTRATION
					0			0	Level 4	1	1	1	1305	1200	1252.5	0.7	0.7	0.7	1130	1025	1077.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
39	26	F	124	124	124	10.2	10.3	10.25	Level 1	2	2.1	2.05	1333	1335	1334	4.6	4.9	4.75	701	782	741.5	
					0			0	Level 2	0	0	0	0	0	0	3.5	3.4	3.45	823	836	829.5	
					0			0	Level 3	0	0	0	0	0	0	3.3	3.1	3.2	635	536	585.5	FENESTRATION
					0			0	Level 4	0.8	0.7	0.75	1216	1419	1317.5	2	1.8	1.9	1533	1671	1602	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
40	33	M	125	125	125	12.2	12.4	12.3	Level 1	2	1.9	1.95	1376	1411	1393.5	6.5	6.6	6.55	982	1039	1010.5	
					0			0	Level 2	1.1	1.1	1.1	1330	1112	1221	4.5	4.6	4.55	702	807	754.5	ABSENT
					0			0	Level 3	1	0.9	0.95	1255	1416	1335.5	2.3	2.8	2.55	1498	1689	1593.5	
					0			0	Level 4	0.7	0.8	0.75	1368	1383	1375.5	1.1	1.4	1.25	1827	1864	1845.5	
					0			0	Level 5	0	0	0	0		0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
41	23	F	137	131	134	13	13.1	13.05	Level 1	2.4	2.3	2.35	640	845	742.5	6.5	6.6	6.55	309	269	289	

					0			0	Level 2	0.7	0.6	0.65	1389	1201	1295	3.9	3.7	3.8	996	914	955	
					0			0	Level 3	0	0	0	0	0	0	3.3	2.5	2.9	1017	1261	1139	FENESTRATION
					0			0	Level 4	0.8	0.6	0.7	1150	1079	1114.5	1.6	1.5	1.55	1675	1691	1683	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
42	26	F	124	125	124.5	11.4	11.5	11.45	Level 1	2.8	2.8	2.8	1329	1219	1274	3.3	3.3	3.3	939	836	887.5	
					0			0	Level 2	1.1	1	1.05	1781	1604	1692.5	1.6	1.6	1.6	1711	1773	1742	ABSENT
					0			0	Level 3	0.8	0.8	0.8	1305	1670	1487.5	0.9	0.8	0.85	1767	1700	1733.5	
					0			0	Level 4	0.9	1.1	1	1511	1688	1599.5	0.8	0.9	0.85	1642	1681	1661.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
43	20	F	127	126	126.5	12.3	11.9	12.1	Level 1	2.3	1.9	2.1	1257	1197	1227	4.6	4.4	4.5	380	285	332.5	
					0			0	Level 2	0.5	0.4	0.45	986	986	986	3.1	2.9	3	972	945	958.5	ABSENT
					0			0	Level 3	1	0.8	0.9	1061	1174	1117.5	1.3	1.3	1.3	1138	1147	1142.5	
					0			0	Level 4	1.2	1.1	1.15	970	994	982	1.2	1	1.1	1495	1475	1485	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
44	18	M	134	130	132	13.6	13.4	13.5	Level 1	3.1	3	3.05	743	731	737	4.7	4.4	4.55	952	984	968	
					0			0	Level 2	1.4	1.4	1.4	1346	1340	1343	2.3	2	2.15	1175	1121	1148	ABSENT
					0			0	Level 3	0.5	0.7	0.6	1414	1434	1424	1.5	1.3	1.4	1337	1387	1362	
					0			0	Level 4	0.6	0.6	0.6	1170	1040	1105	1.3	1.3	1.3	1370	1312	1341	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0	0		0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
45	18	M	131	133	132	13.4	14	13.7	Level 1	2.7	2	2.35	695	711	703	5	4.8	4.9	571	530	550.5	
					0			0	Level 2	1.8	1.3	1.55	1383	1282	1332.5	2.3	2.3	2.3	710	877	793.5	
					0			0	Level 3	0.7	0.6	0.65	1434	1412	1423	2.1	1.9	2	1571	1559	1565	ABSENT
					0			0	Level 4	0.6	0.6	0.6	833	994	913.5	1.4	1.2	1.3	1266	1297	1281.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
46	30	M	128	130	129	12.5	12.6	12.55	Level 1	2.7	2.7	2.7	1248	1337	1292.5	4.9	5.2	5.05	392	305	348.5	
					0			0	Level 2	0.8	1	0.9	1521	1567	1544	1.8	2	1.9	1163	1195	1179	ABSENT
					0			0	Level 3	0.8	0.8	0.8	1435	1478	1456.5	0.6	0.6	0.6	1370	1247	1308.5	
					0			0	Level 4	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
47	25	M	126	124	125	10.6	10.8	10.7	Level 1	3.1	2.6	2.85	1657	1784	1720.5	4.8	4.8	4.8	935	989	962	
					0			0	Level 2	1.5	1.5	1.5	1849	1872	1860.5	2.3	2.9	2.6	1019	1039	1029	ABSENT
					0			0	Level 3	1.5	1.5	1.5	1295	1244	1269.5	1.3	1.3	1.3	1468	1478	1473	
					0			0	Level 4	1.4	1.4	1.4	1358	1396	1377	0	0	0	0	0	0	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
48	27	F	126	128	127	10.7	10.7	10.7	Level 1	1.5	1.4	1.45	1515	1438	1476.5	4.3	4.4	4.35	417	619	518	
					0			0	Level 2	0.5	0.5	0.5	1008	1183	1095.5	2.1	2.1	2.1	1377	1384	1380.5	ABSENT
					0			0	Level 3	0.5	0.5	0.5	1046	1009	1027.5	0.9	1.1	1	1621	1530	1575.5	
					0			0	Level 4	0.5	0.5	0.5	1619	1603	1611	1	1	1	1615	1562	1588.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
49	23	F	134	137	135.5	11.5	11.4	11.45	Level 1	1.1	1.2	1.15	1399	1363	1381	4.8	4.8	4.8	831	790	810.5	
					0			0	Level 2	0.3	0.5	0.4	1124	1253	1188.5	2.1	2.9	2.5	596	610	603	
					0			0	Level 3	0.2	0.4	0.3	1032	1154	1093	1.6	1.6	1.6	1258	1204	1231	ABSENT
					0			0	Level 4	0.2	0.4	0.3	1132	1064	1098	0.9	1.1	1	1214	1231	1222.5	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
					0			0				0			0			0			0	
50	26	F	126	127	126.5	11.5	11.6	11.55	Level 1	2.3	2.3	2.3	1334	1300	1317	4.9	4.8	4.85	789	757	773	
					0			0	Level 2	0.9	1.2	1.05	1611	1528	1569.5	2.8	2.6	2.7	1285	1399	1342	ABSENT
					0			0	Level 3	0.8	0.8	0.8	1966	1953	1959.5	1.3	1	1.15	1459	1628	1543.5	
					0			0	Level 4	1.2	0.9	1.05	1643	1696	1669.5	0.7	0.7	0.7	1747	1719	1733	
					0			0	Level 5	0	0	0	0	0	0	0	0	0	0	0	0	