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Original Research Article

Measurement Height of Mandible Body in Male and Female of Iraqi Sample Using Panoramic Radiograph

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Abstract

The maxillary and mandibular bones can reflect the status of all of the skeletal bones , any bone lose in the mandible is not due to local factors only such as previous extraction of teeth can be considered as the first sign of osteoporosis in the other skeletal bones and future bone fracture. To obtain statistical data on the alveolar bone height at different regions of the body of the mandible by panoramic radiograph in different age groups of Iraqi males and females. The study include the diagnostic panoramic radiograph of 40 images of randomly selected patients from males and females without sign and symptoms for any systemic diseases affecting the bone. There was a significant high difference between males and females in midline and mental foramen areas. Dentist should pay greater attention to older females patients because they are prone to rapid alveolar bone resorption.

Key Words: panoramic radiography, alveolar bone loss, mandible.

قياس ارتفاع جسم الفك السفلي في الذكور والإناث من العينة العراقية باستخدام الأشعة البانورامية

الخلاصة

عظم الفكي والفك السفلي يمكن أن تعكس حالة كل من العظام والهيكل العظمي، أي العظام تفقد في الفك السفلي ليس بسبب العوامل المحلية فحسب مثل استخراج السابق من الأسنان ويمكن اعتبارها أول علامة على هشاشة العظام في تركيبه عظام الهيكل العظمي الأخرى وكسر العظام الذي قد يحصل في المستقبل.الهدف من هذه الدراسة: الحصول على بيانات إحصائية عن ارتفاع العظم السنخي في مناطق مختلفة من جسم الفك السفلي عن طريق التصوير الشعاعي البانورامي في مختلف الفئات العمرية للذكور والإناث العراقيين.

المواد والأساليب: وتشمل الدراسة التصوير الشعاعي البانورامي التشخيصي ل ٤٠ صورة من المرضى الذين تم اختيارهم عشوائيا من الذكور والإناث دون أمراض الجهازية التي تؤثر على العظام. النتيجة: كان هناك فرق كبير بين الذكور والإناث في خط الوسط ومناطق الثقبة العقلية.

الاستنتاج: يجب على طبيب الأسنان إيلاء المزيد من الاهتمام للمرضى الإناث الأكبر سنا لأنها عرضة لارتفاع العظم السنخي السريع.

الكلمات المفتاحية: التصوير الشعاعي البانورامي، فقدان العظم السنخي، الفك السفلي.

Introduction

The maxillary and mandibular bones can reflect the status of all of the skeletal bones , any bone lose in the mandible is not due to local factors only such as previous extraction of teeth can be considered as the first sign of osteoporosis in the other skeletal bones and future bone fracture , The rate of the turnover of the skeletal bones is probably the fastest in the mandibular bone [1].

The bone undergoes three phases, the first is the modeling phase where the formation of bone dominates its resorption, and these occurred during the childhood and adolescent, the second phase takes place in the maturity where there is a balance between the formation of bone and its resorption , and the resorption of the bone dominates over the remodeling of the bone in the older males and in the females after menopause and this the third phase [2], those phases are under the control of hormones, cytokins [3], and growth factor, the remodeling process occurs at the trabecular bone and at the endosteal surface of the compact bone [4].

This high rate of bone turnover of the mandible is due to its histologic feature since it composed of 20% trabecular and 80% compact but the maxilla has 90% compact bone and only 10% trabecular, compact bone closes off on all sides and the trabecular bone inside it, the remodeling of the bone occurs in the trabecular bone and endosteal level of the compact bone as the structure of trabecular bone of the mandible consist of a network of rods, plates and trabeculea thus and the overall surface is 10 times greater than the compact bone, therefore the mandible has more cells and endosteal surface, so more remodeling process
[5].

In the natural dentition , the stimulation of bone remodeling is due to phenomenon of distribution of the masticatory forces through the periodontal ligament to the alveolar process, after tooth extraction the alveolar bone lacks the stimuli for remodeling and the residual ridge resorption (RRR) begins, RRR is maximum at the first year after the tooth lost and then decrease. There is a great variation in the rate of the resorption from one person to other and even in the same person it is different from site to site in the jaw and in both jaw position and time [6,7].

Bone loss can be occurred due to local factors as tooth extraction[8] and wearing prosthesis [9], and due to systemic factors as post menopause , old age, and hormonal disturbance [10].

The dentists are widely using radiograph for the diagnosis of caries, periodontal disease, before and after implant, in the endodontic treatment, and for various situation demand x-ray to complete the proper diagnosis, a lot of information about osteoporosis found in the intra oral radiograph and in the dental panoramic radiograph because they are routinely used by the dentists , several authors suggested that the bone of the jaw can be considered as the first indicator for osteoporosis and fracture risk [1,11-15].

The aims of this study are to measure the bone height of the mandibular body in different age groups by using digital dental panoramic radiograph and to determine the possible alterations of height and bone loss in relation to the gender and age, which important clues in clinical and surgical treatment planning.

Materials and Methods

Patients

40 patients (20 male and 20 female) were selected according to specific criteria from the patients attending the Oral & Maxillofacial Radiology Department in the Collage of Dentistry Baghdad University for various reasons such as pre surgical assessment or TMG problem etc.

The excluded criteria were :

- Patients with any systemic disease may affect bone metabolism like diabetes mellitus, tuberculosis, Cushing Syndrome, hyperparathyroidism, and generalized osteoporosis.

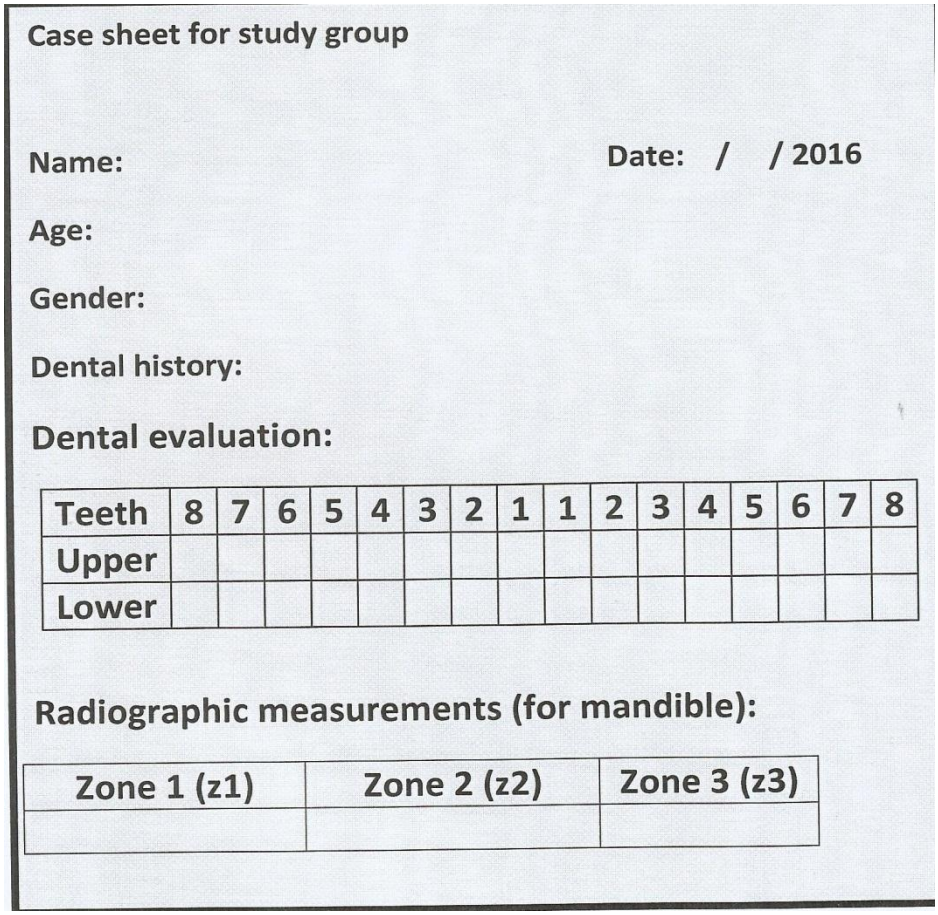
- Patients whom were taking certain drugs like parathyroid hormones, Vit. D, bisphosphonate, estrogen, and any glucocorticoid for long period of time.
- Patients whom have orthodontic treatment for mandibular arch or past history of orthodontic treatment.
- Any pathology or congenital anomaly in the mandible that could affect the bone and interpretation of the radiographic image.

The included criteria were:

Any patient male or female ranged from 20- 75 years old whose does not have any one of the excluded criteria mentioned above.

Case sheet

A case sheet for all the selected subjects including the following information: name, age, gender, and measurement values as in fig (1)



Case sheet for study group

Name: Date: / / 2016

Age:

Gender:

Dental history:

Dental evaluation:

Teeth	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Upper																
Lower																

Radiographic measurements (for mandible):

Zone 1 (z1)	Zone 2 (z2)	Zone 3 (z3)

Figure 1: The case sheet

Materials

Digital dental panoramic radiograph with (planmeca) found in the Oral and Maxillofacial Department with its computer unit and the software supplied by the manufacture as seen in fig(2,3)

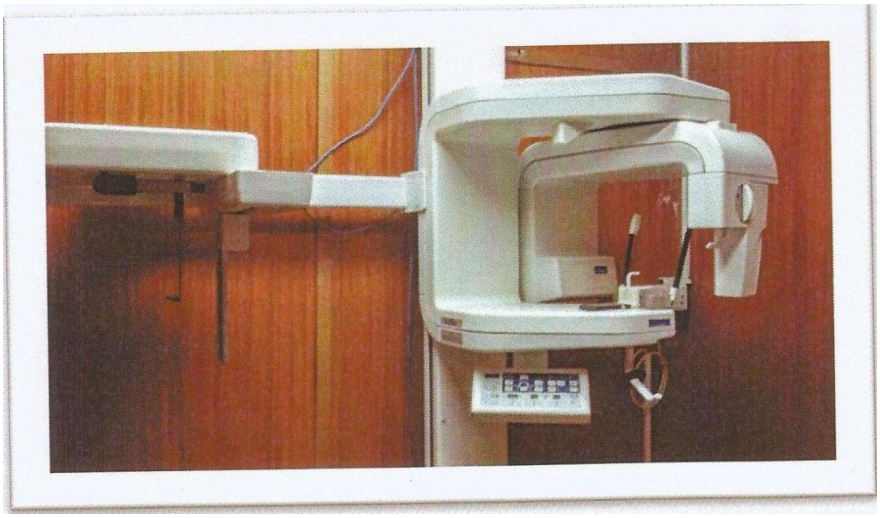


Figure 2: digital panoramic radiography

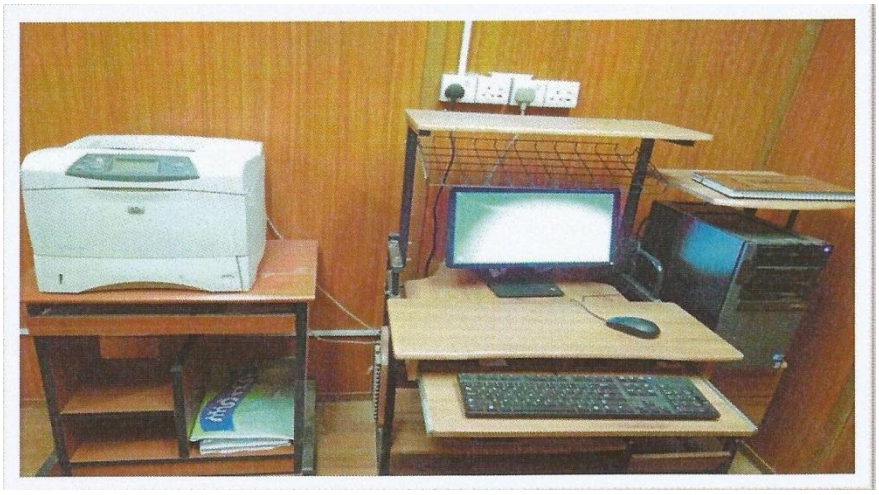


Figure 3: Computer unit of the digital panoramic radiography

Image selection criteria

- The image should show no distortion and no magnification beyond that reported by the manufacture.
- The image should give clear representation for anatomy of the structure of interest.
- The image of the superior and inferior borders of the body of mandible and the mental foramen should be clear and distinct.

Linear vertical measurement

The selected radiographic images are imported by (planmeca romexis) with specific tools for making linear measurements on image of the mandibular jaw.

All 3 linear measurements were done vertically perpendicular to a line parallel to the floor and 3 measurements were performed to describe the bone height .

All the measurement were made on the left side of the mandible images.

The following measurement were taken:

1. Vertical distance from the crest of alveolar ridge to the most inferior point of inferior border of mandible in the midline area referred to by (**Z1**).
2. Vertical distance from the crest of alveolar ridge to the most inferior point of inferior border of mandible through the center of mental foramen referred to by (**Z2**)
3. Vertical distance from the crest of alveolar ridge to the most inferior point of inferior border of mandible through the distal side of lower first molar referred to by (**Z3**)

The static analysis was done using SPSS program version 8 installed in personal computer.

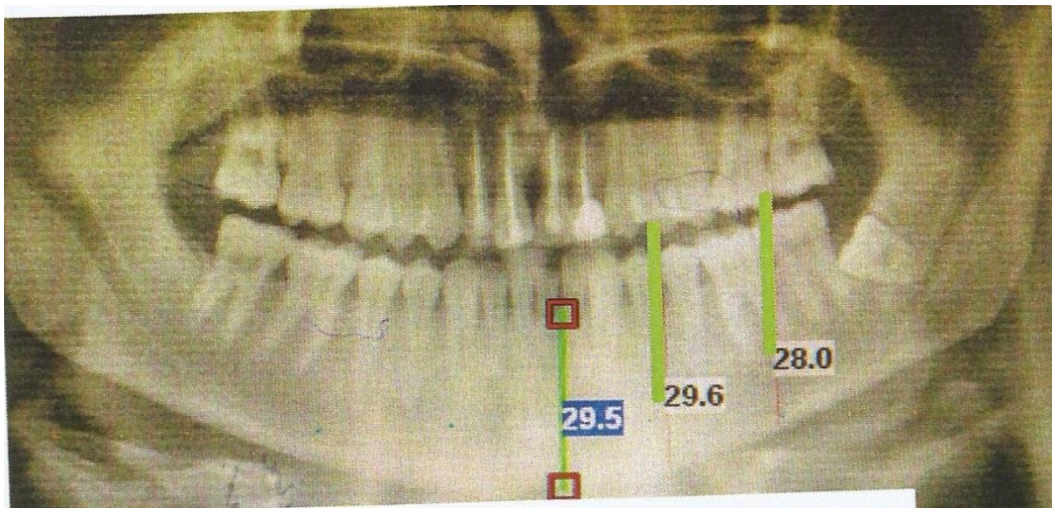


Figure 4: The Measurements(Z1,Z2,Z3)

Results

The subject consist of 40 patients divided into 2 groups according gender (each group consist of 20 patients) as in table (1)

Table 1 : descriptive statistic of study sample

	No.	%
Male	20	50%
Female	20	50%
Total	40	100%

The mean, range, and standard deviation of (Z1,Z2,Z3) of male as in table (2)

Table 2 : Linear measurements in male subjects

	Z1	Z2	Z3
Mean	32.395	29.645	26.03
Range	16.6	19.2	18.7
SD	4.543729	4.856488	4.798448

The mean, range, and standard deviation of (Z1,Z2,Z3) of female as in table (3)

Table 3 : Linear measurements in female subjecta

	Z1	**Z2**	**nbkZ3**
Mean	29.55	26.575	24.16
Range	9.3	8.9	17.6
SD	2.89214453	2.45924277	4.121334735

The comparison of vertical measurement and p value in male and female showing there are significant differences between male and female in **Z1** and **Z2**

Table 4: Comparison of vertical measurement in male and female

	Male	**Female**	**P-value**
Z1	32.445	29.55	0.027513759
Z2	29.645	26.575	0.025144437
Z3	26.03	24.16	0.20549032

The differences between male and female of same age ranges in (**Z1**,**Z2**,**Z3**) values are illustrated in table(3,4,5,6):

AGE: 50 Years	Z1	Z2	Z3
Male: Dentate	29.7	28	27
Female: partial edentulous	25.7	27.2	24.8

AGE:52 Years	Z1	Z2	Z3
Male: Edentulous	28.5	26	23.5
Female: Edentulous	30	24	20.2

AGE:61,60 Years	Z1	Z2	Z3
Male: edentulous	30.5	28.4	25.6
Female: partial edentulous	27	25	22.5

AGE: 71,72 Years	Z1	Z2	Z3
Male: partial edentulous	28.8	28	21.1
Female: Edentulous	26	24	20.4

Discussion

In this study the participants ages were distributed between (20-75) years and among (dentate, partially edentulous, and completely edentulous), the results showed there was a reduction in bone height increased in older ages and there was a difference between males & females in the mean value of mandibular bone height measurements in all of the 3 zones measured , also this study showed that there was gender statically significant difference in variation of Z1& Z2 between males & females, while the study showed that gender was not statically significant difference in variation of Z3, the lack of significance could be related to the small size of the sample but that will not negate the overall differences noticed in Z3 values between males& females.

The results in our study in conformity with that of Salgam [15] & Shaker et al [16], whom showed that edentulous females had greater rate for reduction in the mandibular bone than males.

Because of the continuity of bone loss process so this will lead to the rotation of the mandible in a counterclockwise direction and decrease in the vertical dimension of the face [17]. Bone loss is due to systemic and local factors[8,9,10], after tooth extraction bone loss is rapid for 6 months -2 years and then tend to settle down there after [8], wearing removable partial denture can cause bone loss, as the duration of wearing RPD increased the bone loss would be greater [9]. Previous research showed that the women are more liable to lose the teeth due to pregnancy and other reasons[8].Researches have been

found a correlation between osteoporosis and mandibular bone loss and this correlation can help in the prediction of future fracture risk [1,11-15].

Conclusion

There was a continuous reduction in bone height with age due to multiple systemic and local factors and this reduction is greater in females than in the males samples.

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