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Research Article

RADIOGRAPHIC EVALUATION OF MENTAL FORAMEN TO ASSESS THE AGE AND SEX AS AN AID IN FORENSIC ODONTOLOGY

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ABSTRACT

Introduction: Identity is the set of physical characteristics, functional or psychic, normal or pathological that defines an individual. Forensic radiology, as do all other academic and scientific disciplines, rests on the unsteady four-legged stool of service, education, research and administration. The Routine radiographic examination by orthopantomogram of patient's mandible is necessary and justifiable for treatment. In this study sample of orthopantomographs was surveyed to establish the frequency of radiological characteristics and the trend of ridge resorption in relation to mental foramen in indentifying the age and sex of an individual.

Aims and Objective: To identify the age and sex of an individual by measuring the distance between basal bone to mental foramen to alveolar crest using mental foramen as a land mark in orthopantomogram.

Materials and methods; A cross sectional study was conducted on a total of 102 panoramic radiographs with age group 50-70 years and was divided into four groups on the basis of the chronological age.

Results: For both the sides, a significant difference in height of body of mandible between two genders was observed in age group 50-55 years ($p < 0.05$). For all the other age groups, no significant difference was observed between two genders ($p > 0.05$).

Conclusion: The height of the mandible and lower border to the superior margin of the mental foramen exhibits sexual dimorphism and can be used as an additional radiographic method to determine the gender from skeletal remains.

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INTRODUCTION

Forensic research has been conducted on living population to determine the measurements and values and is being applied on

skeletal remains¹. The contribution of dentistry to human identification takes two main forms: the identification of human according to existing ante mortem dental records, and a postmortem dental profiling in cases where there are no

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antemortem records². When the comparison between the ante mortem and postmortem information, Doesn't reveal common features, or The ante mortem information is unavailable or The conditions of the remains do not allow the identification, a postmortem dental profiling gives a solution³.

Radiographs are said to be indispensable tools that can be made use in forensic anthropology¹. Panoramic radiography is a widely used technique because it has the advantage of providing, in a single film, the image of both jaws, with a relatively low radiation dose, in a short period of time, and at lower cost if compared to more sophisticated techniques³. Of the many normal anatomical landmarks of the human skull and the mandible, mental foramen is a stable marker on the mandible which is fairly well depicted on the panoramic radiograph¹. According to textbooks of anatomy, the mental foramen (MF) is located below the interval between the first premolar teeth, or the second premolar, from which emerge the mental nerve and vessels⁴.

The Present study was designed to evaluate Orthopantomograph (OPGs) of patients to establish the distance between basal bone to mental foramen to alveolar crest in indentifying the age and gender of an individual to determine if any difference exist and if exist it can further aid in forensic investigation

Aims and Objectives

1. To evaluate the distance between the lower border of the mandible to the superior margin of the mental foramen on both left and right side on OPG.
2. To evaluate the distance between the superior margin of the mental foramen to the crest of the alveolar bone on both left and right side on OPG.
3. To correlate all the above parameters with different age groups and gender.

MATERIALS AND METHODS

A cross sectional study was conducted on a total of 102 good quality panoramic radiographs without any distortions, artifacts, pathologies with proper lower border of mandible of subjects age ranged between 50-70 years (51 males; 51 females) retrieved from the department of oral medicine and radiology. Four groups were divided on the basis of Chronological age comprising

Age	Male	Female
50-55 years Group-1	25	23
56-60 years Group-2	12	14
60-65 years Group-3	9	5
66-70 years Group-4	5	9

Mental foramen was identified on both the sides of radiograph by using visual light box and magnifying lens. Tangents was drawn using indelible marking pen from, (Figure-1)

1. Lower border of the mandible to crest of the alveolar ridge to assess the height of the mandible. (A)
2. Lower border of the mandible to the superior margin of the mental foramen.(B)
3. Superior margin of the mental foramen to the crest of the alveolar ridge. (C)

Stainless steel divider and the ruler were used to measure the distance from above said land marks to mental foramen. The data obtained were tabulated and subjected to statistical analysis and subjected to ANOVA test for significance.



Figure-1 Opg Showing Relation of Mental Foramen WITH Lower border of the mandible to crest of the alveolar ridge (A), Lower border of the mandible to the superior margin of the mental foramen.(B), Superior margin of the mental foramen to the crest of the alveolar ridge. (C)

RESULTS AND OBSERVATIONS

For both the sides, a significant difference in height of body of mandible between two genders was observed in age group 50-55 years ($p < 0.05$). For all the other age groups, no significant difference was observed between two genders ($p > 0.05$). A significant difference in mean height of body of mandible among different age groups was observed for both the genders in left side and for males only in right side. (Table-1a, 1b)

Table 1a Height of the body of Mandible on right side

SN	Side	Age group	Height of the body of mandible							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Right	50-55	25	28.4	5.7	23	24.3	3.8	2.900	0.006
2		56-60	12	26.0	4.9	14	24.4	5.6	0.756	0.457
3		61-65	9	21.7	6.0	5	21.4	3.1	0.092	0.928
4		66-70	5	25.2	3.2	9	22.6	3.4	1.395	0.193
ANOVA			5.100			1.817				
P			0.004			0.159				

Table 1b Height of the body of Mandible on left side

SN	Side	Age group	Height of the body of mandible							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Left	50-55	25	28.2	5.4	23	24.0	3.1	3.210	0.002
2		56-60	12	27.9	5.2	14	26.9	6.0	0.455	0.660
3		61-65	9	22.1	5.3	5	22.4	3.8	0.107	0.917
4		66-70	3	19.0	5.2	9	23.8	4.0	1.326	0.214
ANOVA			4.148			2.988				
P			0.010			0.042				

Distance between lower border of the mandible to superior margin of MF between two genders in age group 50-55 years ($p < 0.05$) was significant. For all the other age groups, no significant difference was observed between two genders ($p > 0.05$). A significant difference in mean distance between lower border of the mandible to superior margin of MF among different age groups was observed among females for right side only. (Table-2a, 2b)

Table 2a Distance between lower border of the mandible to superior margin of MF on right side

SN	Side	Age group	Distance between lower border of the mandible to superior margin of MF							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Right	50-55	23	24.0	3.1	25	17.5	2.4	2.628	0.012
2		56-60	14	26.9	6.0	12	17.2	2.6	0.725	0.476
3		61-65	5	22.4	3.8	9	15.0	3.6	0.577	0.575
4		66-70	9	23.8	4.0	3	19.7	6.7	1.676	0.125
ANOVA			2.521			3.399				
P			0.068			0.027				

Table 2b Distance between lower border of the mandible to superior margin of MF on left side

SN	Side	Age group	Distance between lower border of the mandible to superior margin of MF							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Left	50-55	23	15.9	1.8	25	17.3	2.6	2.342	0.024
2		56-60	14	16.5	2.1	12	16.8	2.6	0.968	0.343
3		61-65	5	14.0	1.9	9	15.6	3.1	0.573	0.577
4		66-70	9	15.9	1.9	3	13.7	2.3	1.892	0.088
ANOVA			0.914			2.688				
P			0.441			0.059				

No significant difference in Distance between superior margin of MF to crest of alveolar ridge between two genders was observed in any age group ($p > 0.05$). A significant difference in mean Distance between superior margins of MF to crest of alveolar ridge among different age groups was observed among males for both the sides and among females for left side only. (Table-3a, 3b)

Table 3a Distance b/w superior margin of MF to crest of alveolar ridge on right side

SN	Side	Age group	Distance between superior margin of MF to crest of alveolar ridge							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Right	50-55	25	16.8	4.5	23	14.9	2.8	1.792	0.080
2		56-60	12	14.2	3.8	14	16.1	4.3	1.191	0.245
3		61-65	9	12.7	4.9	5	13.6	2.2	0.397	0.698
4		66-70	3	12.0	7.0	9	13.2	3.3	0.072	0.944
ANOVA			3.126			0.932				
P			0.034			0.434				

Table 3b Distance b/w superior margin of MF to crest of alveolar ridge on left side

SN	Side	Age group	Distance between superior margin of MF to crest of alveolar ridge							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Left	50-55	25	16.3	3.6	23	14.7	2.9	1.722	0.092
2		56-60	12	14.1	4.6	14	16.4	4.4	1.324	0.198
3		61-65	9	12.0	3.5	5	11.6	1.1	0.245	0.811
4		66-70	3	13.0	7.9	9	13.0	3.0	0.166	0.871
ANOVA			3.886			2.995				
P			0.014			0.042				

Distance between lower border to crest of the alveolar ridge between two genders was significant in age group 50-55 years ($p < 0.05$). For all the other age groups, no significant difference was observed between two genders ($p > 0.05$). A significant difference in Distance between lower borders to crest of the alveolar ridge among different age groups was observed among males only for both the sides. (Table-4a, 4b)

Table 4a Distance b/w lower border to crest of the alveolar ridge on right side

SN	Side	Age group	Distance between lower border to crest of the alveolar ridge							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Right	50-55	25	31.1	5.8	23	27.4	3.5	2.595	0.013
2		56-60	12	29.3	4.7	14	27.4	5.7	1.324	0.198
3		61-65	9	25.0	6.5	5	24.4	3.1	0.192	0.851
4		66-70	3	12.7	2.9	9	25.6	3.1	1.467	0.173
ANOVA			4.106			1.958				
P			0.011			0.135				

Table 4b Distance b/w lower border to crest of the alveolar ridge on left side

SN	Side	Age group	Distance between lower border to crest of the alveolar ridge							
			Male			Female			Significance	
			n	Mean	SD	n	Mean	SD	"t"	"p"
1	Left	50-55	25	30.8	5.7	23	27.4	3.1	2.503	0.016
2		56-60	12	31.3	5.0	14	29.6	6.0	0.735	0.469
3		61-65	9	25.1	5.6	5	25.2	3.2	0.033	0.975
4		66-70	3	22.0	5.2	9	26.9	3.6	1.447	0.178
ANOVA			3.779			2.739				
P			0.016			0.056				

DISCUSSION

The mental foramen is a stable landmark on the mandible and fairly well recognized on the panoramic radiographs¹. The mental foramen on each side is located on the buccal cortex of the mandibular bone and lies near the apices of the premolars. It has been shown to be located at precisely the same level on most humans (13-15 mm superior to the inferior border of the mandible)⁵.

Height of the mandible on both the right and left side with the mean of 28.4mm & 28.2mm in males respectively where as in females 24.3mm & 24mm at the age group 50-55 years which was statistically significant with $p < 0.05$ no significant difference was observed in other age group.

The mean values of the height of the mandible were 5.2mm and 1.8mm in both male and female on right side, 4.2mm and 3.0mm in both male and female on left side. The mean values were higher in male than female and it is statistically significant. The findings are in accordance with Balawanth Rai and Sura. A. Rashid⁶. When overall height of the mandible in both genders was evaluated it was found that the height decreased in the female in group 3 & 4. This shows that, loss of teeth causes remodelling and resorption of the surrounding alveolar bone and eventually leads to atrophic edentulous ridges. The rate and amount of bone loss may be influenced by such things as gender, hormones, metabolism and Para function.

A significant difference in mean height of the body of the mandible among different age groups was observed for both the genders in left side and for males only in right side. The findings are in correlation with Balawanth Rai⁶.

Height of the mandible being more on one side depicts the usage of the jaw and teeth of one side and hence other is more of nonfunctional. A significant difference in Distance between lower border of the mandible to superior margin of MF between two genders was observed in age group 50-55 years ($p < 0.05$).

For all the other age groups, no significant difference was observed between two genders ($p>0.05$). The mean values of the distance between the mental foramen and the lower border of the mandible were 3.1mm and 1.2 mm on right side, 3.8mm and 2.8mm on left side in both genders respectively.

A significant difference in mean distance between lower border of the mandible to superior margin of MF among different age groups was observed among females for right side only the findings are in correlation with NM AI Jasser and Nwoku 1998.⁷

According to Thomas CJ (2004)⁸ the distance from the mental foramen to the crest of the alveolar bone is not a reliable gauge to make measurements, as the alveolar bone resorbs with age and with periodontal diseases where as the basal bone remains static through out life. But in contrary to above statement an effort has been made to assess the distance between superior margin of mental foramen to crest of the alveolar ridge and the results are in correlation to above finding. No significant difference in Distance between superior margin of MF to crest of alveolar ridge between two genders was observed in any age group ($p>0.05$).

The variations in the height and distance between superior margin and lower border of the mandible from male to female was significant and the dimensions are low because the study sample includes edentulous mandibles with loss of teeth in the present location. The measurements are significantly higher in males confirming the results of previous study conducted by Enlow & Hans⁹ they confirmed that in the adult phase the rate and speed of growth are higher in men, so craniofacial dimensions in this gender are from 5to9% bigger when compared with women. Bone growth in the adult phase can be controlled by multiple factors, sex hormones, such as estrogen and progesterone can influence in the speed of bone growth in this phase, contributing to the development of craniofacial morphologic differences between the genders.

Hence the study sample included patients radiograph after 18 years because the growth spurts can disturb the position and dimensions. The muscular tension is considered an inductive factor of bone formation, and in the mandible, the contraction of the elevating muscles during masticatory movements exerts tension throughout the mandibular ramus. In general men have stronger masticatory muscles than the women. The two factors explain the measurements predict the gender and age.

CONCLUSION

It can be concluded that the height of the mandible and lower border to the superior margin of the mental foramen exhibits sexual dimorphism and can be used as an additional radiographic method to determine the gender from skeletal remains of edentulous patients.

The present study failed to assess age from mental foramen because of the less number of radiographs. Hence we recommend more number of radiographs to confirm this landmark in edentulous patients can be used to assess age in forensic dentistry.

We further conclude that mental foramen in OPG is an additional landmark to an existing and can aid in forensic radiology to identify the unidentified from radiographic records.

References

1. Mahima V.G, Karthikey Patil, Srikanth H.s: Mental foramen for Gender determination: A panoramic radiographic study. Medico-Legal update. July-December, 2009, vol.9. No.2.
2. Stavrianos C, Kokkas A, Andreopoulos E, Eliades: A. Applications of Forensic Dentistry: Part-I. *Res J Med Sci* 2010; 4(3): 179-186.
3. Sura A. Rashid, Jamal Ali: Sex determination using linear measurements related to the mental and mandibular foramina vertical positions on digital images: *J Bagh College Dentistry* vol.23 (special issue), 2011.
4. H. Yesilyurt, A.Aydinnlioglu, A. Kavakli, N.Ekinci, C.Eroglu, M. Hacialogullari, S. Diyarbakirli: Local Difference in the position of the Mental Foramen: *Folia Morphol.*2008;Vol. 67, No. 1, pp. 32–35
5. Haghanifar S, Rokouei M. Radiographic evaluation of the mental foramen in a selected iranian population. *Indian J Dent Res* 2009; 20: 150-152.
6. Balawanth Rai: Possible identification marker in Orthopantomograms: Edentulous, Middle East Journal of Scientific Research 2 (2): 82-83, 2007.
7. NM Al Jasser and AL Nwoku. Radiographic study of the mental foramen in a selected Saudi population: *Dentomaxillofacial radiology* (1998) 27, 341-343.
8. Thomas CJ, Madsen D and Whittle C.A Radiographic survey of the edentulous mandible relevant to forensic dentistry. *Leb J Dent Med* 2004; 3: 15-20.
9. Enlow DH & Hans MG: Understanding Facial Growth. 2nd, 2001, Sao Paulo, Santos.

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