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Radiographic Determination of the Position of Mental Foramen in a Selected Population of Kerala (South India)

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I. Introduction

Restoration of the form and function without any violation to important anatomic structures is the most basic goal in the surgical management of any patient[(1).]While performing dental sugeries,the dentist should be well aware of the anatomy of the oral cavity and important landmarks in the close proximity.One such oral region that causes considerable concern during periapical surgery is the mandibular premolar region ,due to its close proximity to the mental nerve.The mental nerve,terminal branch of the inferior alveolar nerve, passes through the mental foramen to supply sensory innervation to the lower lip,buccal vestibule and gingiva upto the premolars.It is extremely important to be able to localise this nerve before attempting any surgeries to avoid inadvertant damage to this nerve. The mental foramen is defined as the entire funnel-like opening in the lateral surface of the mandible at the terminus of the mental canal[(2).]The average size of the foramen is 4.6 mm horizontally and 3.4 mm vertically on the lateral surface of the mandible [(3).]This foramen marks the termination of the mandibular canal in the mandible and is also the point of emergence of the mental nerve and vessels.The position of the mental foramen is of significant importance in giving anesthesia, treatments of fractures related to parasymphysis area, osteotomies required for orthognathic and implant placement, giving complete denture in mandible etc.Variations in the position of mental foramen in diffrent ethinic groups have been reported by many authors. As the location of the mental foramen in the Kerala population has not been described previously, this study was undertaken to determine the most common (modal) position of the mental foramen in a selected population using orthopantomograms and to corelate the position with the gender of the patient.This study was also aimed to compare the position of mental foramen of Kerala population with various other populations to verify the ethinic variations seen.

II. Materials And Methods

For the purpose of this study ,the OPGs of 90 patients who had reported previously to Amrita School of Dentistry were collected and analyzed for recording the position of mental foramen and the positions were denoted as follows:

A= mental foramen mesial to 4 (1^{st} premolar)
B=mental foramen below 4
C=mental foramen distal to 4
D=mental foramen between 4 and 5 (2^{nd} premolar)
E=mental foramen mesial to 5
F=mental foramen below 5
G=mental foramen distal to 5

All patients above the age of 18 was included in the study.Only high quality OPGs with respect to contrast and angulation were included.Only those patients with all mandibular teeth from right first molar to left first molar were taken.Patients with missing teeth,especially missing canine and those with mixed dentition were excluded from the study.OPGs in which the mental foramen could not be identified clearly were not considered.OPGs showing periodontal lesions in the mandibular dentition were excluded from the study.

Statistical Analysis

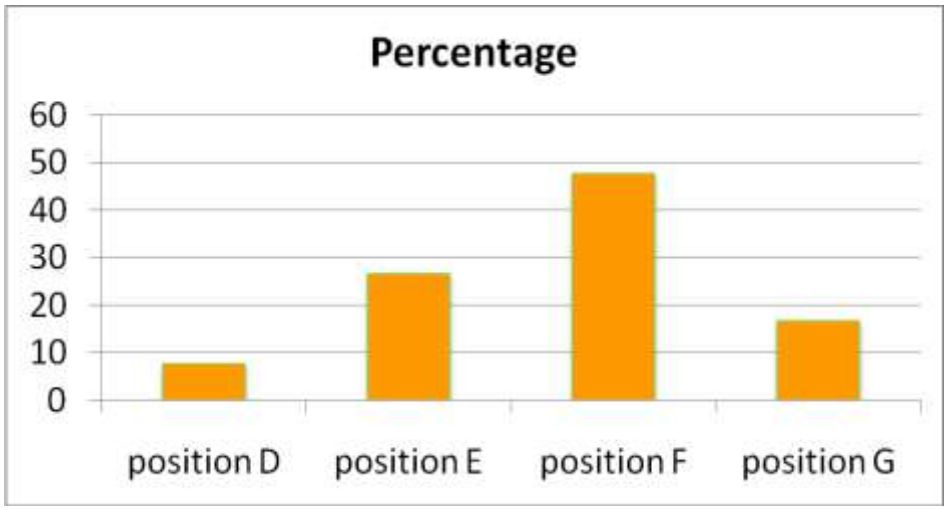
The statistcal analysis was done using IBM SPSS version 20 software.CHI square test was used to compare the positions and the age of the patients.

III. Results

Of the 90 panaromic radiographs that were analysed,41 were of female patients and the rest 49 were of male patients.The mental foramen was found to be bilaterally symmetrical in 58(64.4%) radiographs with the remaining 32 (35.5%) being asymmetrical.In this study, study,the most common position for the mental foramen in relation to the premolars was in line with the second premolar (position F) ,both on the right and left side.The second most common location was mesial to the second premolar (position E) ,followed by (position G) distal to the second premolar.Position D (mental foramen between 1st and 2nd premolar) was recorded on the right side for 7 cases and on the left side for 5 cases.Position C (mental foramen distal to the 1st premolar) was recorded in only one case on the right side.Position A **A**(mental foramen mesial to 1st premolar) and position B(mental foramen below 1st premolar) were not recorded in any of the cases.

No Corelation was found between gender and the position of mental foramen.

POSITION	MALE		FEMALE		FREQUENCY	
	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT
C	0	0	1	0	1.1	0.0
D	4	1	3	4	7.8	5.6
E	10	10	14	15	26.7	27.8
F	23	29	20	19	47.8	53.3
G	12	9	3	3	16.7	13.3



IV. Discussion

The present study provides information about the position of mental foramen among the population of Kerala. Anatomically, the mental foramen is the opening of the short mental canal, a branch of the mandibular canal. Although on most standardized panoramic radiographs, the radiographic landmarks of the mental foramen can be seen, the appearance of these landmarks varies without any change of radiographic quality[(3).]Most of the readily available editions of books on dental analgesia indicate that the mental foramen is most commonly found between the apices of the first and second premolar. However, this teaching is in accordance with the results of early studies done in European populations, and completely ignores more recent data and is therefore misleading. Also many studies done on various populations have shown variations in the position of the foramen accordingly. In a study done on the white population, the location was found to be below the apex of the second premolar and among the Black poppulation it was found between the apex of the 2nd premolar and first molar[(1).]Julian Rp had done a study on the North American white population .he found the position to be between the 1st and 2nd premolar [(4).]Among the Malayasian population,it was found to be below the apex of the 2nd premolar [(3).]Similar studies has also been done in India among various states.In the gujrati popultaion, in a study, they found the position of the mental foramen to be between the 1st and 2nd premolar, similar to the North American white population[(5).] A 2004 Stanford study conducted with a wide sampling from India, found that the of genetic markers in Gujarat were partially of West Eurasian origin.This could explain the similarity in the position of the mental foramen in these 2 populations.

On the contrary, studies done in Maharashtra population and South Andhra population revealed the position of the foramen to be below the apex of the 2nd premolar [6,7].These populations are considered to be of Dravidian race. Hence significant differences have been reported in the position of the mental foramen in different ethinic groups.

According to our knowledge this is the first study done to analyse the position of this foramen among the Kerala population.Panaromic radiographs were used for the study as they were advantageous over the periapical radiographs,since larger areas of hard and soft tissues were recorded.It also gave a more accurate visualisation of the mental foramen [3].In the analysis of 90 radiographs,the distribution of mental foramen position was localized between the apex of first premolar to distal to the apex of the second premolar.No position was recorded mesial to the apex of first premolar . In our study,we found that **50.5%** of the study population had their mental foramen located at the apex of 2nd premolar.In **27.25%** of the study population,it was located mesial to the 2nd premolar.In **15%** of the population,it was seen distal to the 2nd premolar. Gender wise distribution of the mental foramen position was also analyzed.Majority of the patients in both groups recorded the mental foramen location below the 2nd premolar. This was in accordance with the earlier results.

Today in this era of globalization,we as dentists gets plenty of oppurtunities to treat patients from various ethinic groups and communities.Hence a knowledge about the variations in the position of mental foramen in different populations will help us in the long run.

V. Conclusion

This study concludes that the most prevalent location of the mental foramen among the population of Kerala is below the apex of the 2nd premolar.The distribution of the mental foramen was not always bilaterally symmetrical in every individual,but,the most prevalent position of mental foramen in both,the right and left side,was below the apex of 2nd premolar. The knowledge of the variations of the mental foramen is important for the dental surgeons while they perform periodontal surgeries,dental implantations and other endodontic and orthognathic surgeries.(*Shankland WE 94*)The present study will be useful for preventing complications & for better outcomes of surgical procedures which are related to the mental foramen and the mental nerve.

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