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REVIEW ARTICLE

Evaluation of Mental Foramen Location – A Review Article

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Abstract

Abstract: One of the most vital anatomical structure within the mandible is the mental foramen. The significance of this structure come since it is the anatomical opening of mandibular canal on the mandible bilaterally. The neuro-vascular complex leaving from the foramen has a critical and important role and giving supply to the skin and muscles of the chin, lower lip, the associated gingiva and mucosa following to the lower premolars. Subsequently, the location knowledge of the mental foramen considers an awfully significant for dental specialists to dodge harming this imperative structure via the dental working on this region, as in dental anaesthesia, dental surgery, dental anaesthesia and root canal treatment.

The aim of study: The point of the think about: To assess the site of the mental foramen in relative to the mandibular premolars, depended on the panoramic and CBCT and O.P.G images.

Materials and Methods: The current study involved the previous articles published from 1997 till 2019, with respect to the site of mental foramen in elderly and adult patients, in any case of the gender. All these studies were used on either the panoramic and cone-beam computed tomographic images for visualizing the site of the mental foramen.

Results: Regarding the outcomes of the previous studies included in this review, the statistics appeared that the first common area of mental foramen was beneath the apices of lower second premolars in the percentage of 49.99%, the other second common area of mental foramen was between the apices of the lower first and second premolars in the percentage of 42.30%.

Conclusion: The mental foramen was mostly found beneath the apices of lower first and second premolars and then between the apices of the lower first and second premolars.

Keywords: Mental foramen, Mental nerve, Mandible, Mental artery, Mandibular canal, Inferior alveolar canal.

1 | INTRODUCTION:

Mental foramen founded as a funnel like orifice represent the hole of the mandibular canal existing on both sides of mandible. The mental nerve is involved in this canal and emerged from on this orifice. The mental artery exits in conjunction with the mental nerve, this artery represents a branch of the inferior alveolar artery.[1][2] These neuro-vascular complex give the supply to gingiva in area following to the premolars as well as give supply to alveolar mucosa, lower lip and the skin of chin .

High safety measures must be involved via practicing of dental surgery to evade harming of these imperative structures by utilizing the appropriate imaging techniques.[3][4] Harming of the mental nerve via the dental procedure or due to other causes will lead to defects in the lower lip sensation, in addition, the surrounding skin and soft tissues.[5],[6] Mental foramen also showed wide anatomical varieties including the site, size and shape of the mental foramen.[7–9]

The site of mental foramen was mostly either under the apices of mandibular 2^{nd} premolars,[10][11][12] or between the apices of mandibular 1^{st} and 2^{nd} premolars.[13] But on the other hand, numerous varieties with respect to the site of mental foramen were reported.

Different conditions are affected on the site of the mental foramen directly as age, gender, loss of teeth, race and bone resorption.[14]

The exact identification of the mental foramen area still even now the most common challenging for many dentist arranging to operate on or close the mental foramen. Different imaging procedures utilized to identify the site of mental foramen as "Panoramic radiograph O.P.G, Periapical radiograph, Computed tomography (CT), Magnetic Resonance Imaging (MRI) and Cone-Beam Computed Tomography(CBCT)".[15] Panoramic radiographs have restriction on visualizing of the MF area, particularly within the buccolingual measurement as well as, horizontal and vertical planes magnification. CT shows great changes within the visualization of location and anatomy of dental structures.[16]

These days, CBCT considered the foremost exact imaging innovation that utilized to identify the exact location of the mental foramen, and the route of the mental nerve through the mandibular canal canal.[17]

2 | MATERIALS AND METHODS:

The current study involved the previous articles published which were achieved in deferent areas of the world, from 1997 till 2019, with respect to the site of mental foramen in elderly and adult patients, in any case of the gender. All these studies were used on either the panoramic and cone-beam computed tomographic images for visualizing the site of the mental foramen to assess the site of the mental foramen in relative to the mandibular premolars. **Table 1.**

3 | RESULTS:

The statistics of the reviewed studies included in this review appeared that the first common area of mental foramen was beneath the apices of lower second premolars in the percentage of 49.99%, the other second common area of mental foramen was between the apices of the lower first and second premolars in the percentage of 42.30%, and the next location was at the line of apices of the lower second premolars in the percentage of 4.11%, the next area after that was between the lower second premolars and the lower first molar in the percentage of 3.84% , in addition to a very small proportion was slightly up to the apices of lower second premolars.

Supplementary information The online version of this article (https://doi.org/10.15520/mcrr.v3i7.107) contains supplementary material, which is available to authorized users.

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TABLE 1: Locationof Mentalforamen regarding the different previous studies in different populace.

Population	Site
Byzantiums, 1997[39]	1- Between lower right premolars. 2- In a line along the lower left 2nd premolars.
Zimbabweans, 1998[40]	1- Beneath the lower right 2nd premolars. 2- Between the lower left 2nd premolars and left first molars.
Caucasians, 2004[19]	Between lower premolars.
Malawians, 2005[14]	The perpendicular level of mental foramen was frequently situated approximately beneath the mid-route between the alveolar edge and the lower border of lower jaw.
Tanzanians, 2007[12]	1- Below and between the apices of the lower 2nd premolars. 2- Between the lower 2nd premolars and lower 1st molars.
Jordanians, 2007[41]	Below and between the lower premolars.
Sri Lankans, 2009[24]	1- In a level along the long axis of the lower 2nd premolars. 2- Between lower premolars.
Japanese, 2009[42]	1- Between lower premolars and beneath the lower right 2nd premolars. 2- Between lower left premolars.
Iraqi, 2010[43]	Below the apices of the lower 2nd premolars.
Nigerian, 2012[44]	In a level of the apices of lower 2nd premolars.
Turkish, 2013[45]	1- In a level along the long axis of the lower 2nd premolars. 2- Between lower premolars.
Chinese, 2015[46]	In a level along the long axis of the lower 2nd premolars.
Indian, 2015[47]	1- Between lower premolars. 2- In in the plane along the lower 2nd premolars.
Brazilian, 2015[48]	In a level along the long axis of apices for the lower 2nd premolars.
Iranian, 2016[49]	1- The mental foramen (in a horizontal level) placed on a level with the lower 2nd premolars. 2- Between lower premolars.
UK, 2016[50]	Between lower premolars.
Indian, 2017[51]	Beneath the apices of the lower 2nd premolars.
Saudi, 2017[52]	1- Beneath the apices of lower 2nd premolars. 2- Beneath lower premolars.
Belarusian, 2017[53]	Between lower premolars.
Serbian, 2017[54]	Beneath the apices of the lower 2nd premolars and mesially directed.
Brazilian, 2017[55]	Near the apices of the lower 2nd premolars.
Saudi, 2017[56]	1- Between the lower premolars. 2- Beneath the apices of lower 2nd premolars.
Turkish, 2008[57]	In a level along the long axis of the lower 2nd premolars.
Indian, 2018[57]	Beneath the apices of the lower 2nd premolars
Saudi, 2018[58]	1- In a level along the long axis of the lower 2nd premolars. 2- In a line with the long axis of lower 1st premolar.
Polish, 2019[59]	1- Beneath the apices of lower 2nd premolars. 2- In the apical level of lower 2nd premolars.
Pakistanian, 2019[60]	1- Beneath the apices of lower 1st premolars. 2- Beneath the lower 2nd premolars.

4 | DISCUSSION :

Many researchers have centered on the status of the mental foramen. Their studies have focused according to the location, shape and dimensions of mental foramen and many variations have been found in this respect. In clinical practice, The anatomical site of the mental foramen play a very significant role, so the dentist operate on or close this foramen must take into the regard the site of this foramen since any harm to the neurovascular complex emitting from the foramen may lead to transitory or persistent loss of sensation in the supplied area by this complex depending on the seriousness of the harm. Subsequently, knowing the exact anatomical site of the mental foramen maybe effective step to avoid any damage to this vital structure during dental operation close to or on the mental foramen.

For instance, the anesthesia of mental nerve block elevates the chance of hitting the crucial structures within the mental foramen. In addition, during the endodontic treatment of mandibular premolars, the threat of harm to the mental nerve is very possible, particularly within the individuals with the area of the foramen close or straightforwardly on the apices of the lower premolars, especially lower 2nd premolars. The dental implants placed at the area of the premolars have also a really critical circumstance due to the presence of mental foramen, the same thought must be taken when planning the surgical flap on or close this foramen. So, the radiographic assessment of mental foramen is very important before any action in or close this foramen.

Various imaging advances utilized to imagine the mental foramen as panoramic radiography, periapical radiography, computed tomography and cone-beam computed tomography. The last two innovations considered the most exact imaging technologies compared to the other innovations. Cone-beam computed tomography enhancing the imaging of the dento-maxillofacial structures, so it gives more accurate picture in these areas than in computed tomography.

Researches of mental foramen had reported extensive varieties with respect to the race, gender and age.[18] For instance, within the Caucasian populace the mental foramen was located between lower 1st and 2nd premolars.[7] Whereas within the Mongoloids populace was located near to the apices of lower 2nd premolars.[19][20]

The reviewed results in this current review with respect to the site of the mental foramen and they were showed that the most location of mental foramen is beneath the apices of lower 2nd premolars (in the rate of 44.99%), In most populace of Iraq, India and Korea found the most site of mental foramen was beneath the apices of the lower 1st and 2nd premolars or 1st molars in the percentages of 60.1%, 72.2% and 62.5%,, respectively.[21][22][23] The site of mental foramen was commonly distinguished along a line at the long axis of the lower 2nd premolars in Saudi[13], Kenyan[24], Nigerian[25], Sir Lankan[26], Chinese[27][28] **Figure 1.**

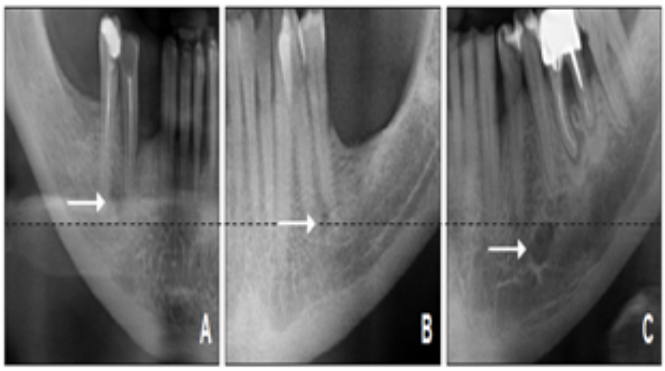

FIGURE 1: Different panoramic images (O.P.Gs) showing thesite of the mental foramen in theperpendicular line in relative to apicesof premolars; (white arrows). A- Coronal to the apex; B- At the apex; C- Apicalto the apex.[61][62]

The most next site of mental foramen in the current review was between the apices of the lower 1st and 2nd premolars (in the rate of 42.30%). Several researches have registered that the most common site of the mental foramen was between the lower premolars based on O.P.G.[29][30][31] and CBCT.[32][33] Researches achieved in the population of Turkey and Asia appeared the site of mental foramen was between the lower premolars (in the rates of 71.50% and 63%), respectively.[34][31]

The differentiation of mental foramen regarding the location may be due to racial variation within the populaces. This is compatible with the Green's result.[35] The variety regarding the site of mental

foramen was also conducted to be hereditarily as a result of the rising of mandibular measure along the development period.[36] Natural variables as propensities of eating or alteration within the nature of food.[37][38] and muscles dystrophy.[37] All these circumstances had attributed to influence the site of mental foramen.

Figure 1. Different panoramic images (O.P.Gs) showing the site of the mental foramen in the perpendicular line in relative to apices of premolars; (white arrows). A- Coronal to the apex; B- At the apex; C- Apical to the apex.[61][62]

5 | CONCLUSION:

The mental foramen was mostly found beneath the apices of lower first and second premolars and then between the apices of the lower first and second premolars.

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