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Assessment of Inter-Incisal Distance among the Bachelor Level Students of a Tertiary Care Centre of Nepal

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ABSTRACT

INTRODUCTION: The inter-incisal distance at maximum mouth opening has been referred to as normal mouth opening. Variations in the inter-incisal distance exists among different age groups, sex, gender, race and ethnicity. The mean inter-incisal distance is required during the treatment of maxillofacial fractures, temporomandibular joint disorders, oral malignancies, reconstructed mouth anomalies, and craniofacial syndromes. The aim of this study was to determine the maximal inter-incisal distance among bachelor level students of tertiary care center of Nepal. **MATERIALS AND METHODS:** A descriptive cross-sectional study was conducted among the 320 bachelor level students of Chitwan Medical College. Convenience sampling method was used. Sex and ethnicity of the patient were recorded. Inter-incisal distance was measured in all the participants with the help of tongue depressor. The data were entered in Microsoft Excel 2019 and later transported to Statistical Package for Social Science (SPSS) version 16 for the statistical analysis. Descriptive statistical analysis was done. **RESULTS**: In this study among the 320 participants 131 (40.9 %) were male and 189 (59.1 %) were female. The mean age was 22.34 ± 2.02 years. The mean inter-incisal distance of male and female was 48.69 ± 6.92 mm and 46.51 ± 6.24 mm respectively. The mean inter-incisal distance was maximum in Muslims who had inter-incisal length ie.51.24± 3.54 mm, followed by Buddhists 48.86± 5.89 mm. **CONCLUSIONS:** This study concluded that the mean inter-incisal distance of male was more than that of female. On the basis of religion, Muslim students had maximum inter-incisal length followed by Buddhists, Hindus and Christians. On basis of ethnicity this study documented the maximum inter incisal distance in Chhetris and minimum in Newars.

Keyword: Inter-incisal distance, maximum mouth opening, tongue depressor

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INTRODUCTION

Mouth is the natural opening that allows food to enter an animal's body, which in vertebrates is normally enclosed by the tongue, gums, and teeth and is outwardly and internally bordered by the lips and pharynx [1-3]. Normal mouth opening has been defined as the maximum inter-incisal distance at active phase of mouth opening. We frequently encounter the mouth opening problem in our regular practice. More patients are now being directed to oral and maxillofacial surgery and plastic surgery centers for treatment of maxillofacial fractures, temporo-mandibular joint disorders, oral cancers, reconstructed mouth abnormalities, and craniofacial syndromes. Treatment and follow-up for all of these disorders depend on the mouth opening [4]. The range of mouth opening must be understood by the physician to conduct an in-depth oral examination. One of the initial symptoms of many pathological and traumatic diseases is limited mouth opening [5].

It has been demonstrated that mouth opening varies greatly among different age, sex, gender, race and is specific in each population. In our daily practice, it is fairly typical to describe the mouth opening as breadth of finger [5, 6]. Mouth opening among different population has been shown to vary considerably with specific range for a given population. Studies related to mouth opening are very few in Nepalese population[1, 7] and we do not have baseline data related to age group 20-30 years. The purpose of this study was to estimate the maximum inter incisal distance among the bachelor level students at a tertiary care center of Nepal.

MATERIALS AND METHODS

Study design and setting

A descriptive cross-sectional study was adopted to conduct this study. The study was conducted among bachelor level students of Chitwan Medical College, Chitwan, Nepal. The duration of study was from 15th May 2022 to 15th August 2022.

Participants and procedure

Based on the study of Joshi et al., [1] taking σ=6.21 mm, E=0.5 and at 95% confidence interval and using formula $n=Z^2\sigma^2/E^2$, the sample size was calculated as 296.295. However, in the study total 320 students participated. Convenience sampling method was used to collect the data Students studying in the bachelor level program (MBBS, BDS, BN, BMIT) at Chitwan Medical College with fully erupted maxillary central incisors were included in the study. The participants with fractured, crowned or attrited central incisors, history of bruxism, severe orthodontic problems, muscular, neurological and signs and symptoms of temporomandibular disorders, angular cheilosis or oral ulcers affecting mouth opening were excluded from the study.

Before the start of study, the objectives were well explained to the participants and then demographic information was collected in a proforma. Other information such as previous history of trauma, tenderness or clicking sound at rest or during jaw movements and any head and neck disorders, systemic diseases, neurological disorders, or craniofacial deformities were also collected on proforma. This was then followed with oral examination. The maximal inter-incisal distance was considered as maximum distance of unassisted active mouth opening. Measurement of maximum mouth opening was carried out using the dental chair light source and tongue depressor. The participants were asked to sit on dental chair with their heads rested against a firm wall surface in upright position.

The participants were verbally encouraged to open the mouth as far as possible, while the investigator measured the maximum distance from the incisal edge of maxillary central incisor to the incisal edge of mandibular central incisor at the midline with the help of tongue depressor. The distance was marked on tongue depressor with a sharp pencil. The measurement of each participants marked on tongue depressor was later measured by digital Vernier caliper and transferred to the excel sheet. This method was adopted to avoid contamination of using Vernier caliper in many participants and each participant was measured by separate tongue depressor. All the measurements was performed by a single investigator to avoid intra-examiner variations.

Statistical analysis and data management

The collected data were entered in Microsoft Excel 2019 and later transported to Statistical Package for Social Science (SPSS) version 16 for the statistical analysis. Descriptive statistical analysis was done and the results was tabulated using frequency, percentage, mean and standard deviation.

Ethical considerations

Ethical approval for this study was obtained from the Institutional Review Committee of Chitwan Medical College, Chitwan, Nepal (Ref No. CMC-IRC/078/079-215). A written informed consent was obtained from the participants who agreed to be a part of this study.

RESULTS

A total of 320 students participated in this study. Among 320 participants, 131 (40.9 %) were male and 189 (59.1 %) were female. The mean age was 22.34 ± 2.02 years. Hindus comprised of 299 (93.4%), Muslims 13 (4%). Our observation showed that 167 (52.2%) were Brahmins (Table 1).

Table 1| Socio-demographic characteristics of the participants (n=320)

Characteristics		Frequency (%)
Mean Age (years) ± SD		22.34±2.02
Gender	Male	131 (40.9)
	Female	189 (59.1)
Religion	Hindus	299 (93.4)
	Buddhists	13 (4.0)
	Christians	4 (1.3)
	Muslims	4 (1.3)
Ethnicity	Brahmins	167 (52.2)
	Chhetris	50 (15.6)
	Newars	18 (5.6)
	Others	85 (26.6)

On the basis of gender, the mean inter-incisal distance of male and female was 48.69 ± 6.92 mm and 46.51 ± 6.24 mm respectively. On basis of religion, Muslims had maximum inter incisal length ie.51.24± 3.54 mm, followed by Buddhists: 48.86± 5.89 mm, Hindus: 47.35 ± 6.63 mm and Christians: 42.75± 7.51 mm. whereas on basis of ethnicity this study documented the maximum

inter-incisal distance was in Chhetris 48.06±5.69 mm and minimum in Newars: 44.79±6.99 mm (Table 2).

DISCUSSION

Mandibular movements are complex in nature and are regulated by various factors residing in the oral cavity such as the contacts of opposing teeth, the temporomandibular joints (TMJ), the axes around which the mandible rotates, the action of muscles, and ligaments, and the neuromuscular integration [8-10]. Dentists practice their profession within the mouth and anatomic regions related to or around the mouth and mostly concerned with the patients' mobility and mouth opening as optimum mouth opening is required to perform various dental procedures [11]. Besides this mouth opening is a condition which is essential in our daily life from eating food, laughing, yawning to speech. Adequate mouth opening is also necessary for general anesthetists to perform cardiopulmonary resuscitation. Several pathologies of the mouth can restrict the mouth opening such as in case of dental infections in the third molar regions, fractures of mandible, space infections, ranulas, tumors and cysts. Maximum mouth opening is thus, a crucial diagnostic tool for assessing the stomato-gnathic system, particularly in people who have neurogenic dysfunctions, oro-facial infections, suspected temporo-mandibular joint problems, and trauma [9, 12-14].

To assess the degree of restricted mouth opening it is essential to first establish the normal range of mouth opening [15-17]. For all practical purposes, the maximum inter-incisal distance is taken as the mouth opening of an individual. Studies have shown various findings related to maximum mouth opening. Joshi et al. in their study conducted among children in Newari population of Bhaktapur reported that males have maximum mouth opening of 41.61mm while females have maximum mouth opening of 40.22 mm [1]. Another study conducted in Nepal among normal subjects and in patients with oral submucous fibrosis, the authors documented the mean value of inter-incisal distance of 47.1 ± 6.7mm [7].

In the present study; the mean value of maximum inter-incisal distance was 48.69 ± 6.92 in males and 46.51 ± 6.24 in females. This was higher than the study conducted by Joshi et al [1]. The variation may be due to the difference in the age group selected. However, the results was similar to that reported by Cox and Walker [7]. Khare et al. also documented in their study that the maximum mouth opening was higher in males 51.3mm than in females 44.3 mm [5]. Similarly,

Table 2|Inter-incisal distance on basis of gender, religion and ethnicity

Inter-incisal Distance	Mean ± SD (mm)
Sex	
Male	48.69 ± 6.92
Female	46.51 ± 6.24
Religion	
Muslims	51.24± 3.54
Buddhists	48.86± 5.89
Hindus	47.35 ± 6.63
Christians	42.75± 7.51
Ethnicity	
Chhetris	48.06±5.69
Others	47.98± 6.99
Brahmins	47.19± 6.58
Newars	44.79±6.99

Gallagher et al. studied the normal mouth opening in Irish population and found that the normal mouth opening in males was 43.3mm and in females was 41.4 mm [18]. Moosa et al. also reported male participants had a greater mouth opening of 48.35mm compared to female participants, who had a maximum mouth opening of 36.39 mm [19]. The present study reported the maximum mouth opening of 48.69 ± 6.92mm in males and 46.51 ± 6.24mm in females. The variations among different studies may be due to the different geographical settings. Several studies have shown that the range of mouth opening varies significantly with age, gender, body size, and race [2, 20, 21].

In this study based on religion the maximum mouth opening is highest in Muslims 51.24± 3.54mm and lowest in Christians 42.75± 7.51mm. On basis of ethnicity, the maximum inter-incisal distance was higher in higher in Chhetris 48.06±5.69mm and lowest in Newars 44.79±6.99mm. Joshi et al. also had conducted their study on Newari population of Bhaktapur, however, the study was restricted among children [1]. Children are at the phase of growth and development so the results cannot be correlated with the present study. Further ethnicity-based study and study involving different age groups are also essential in Nepal. Different methods are used to measure the mouth opening. Measuring the mouth opening with metal or fiber ruler [22, 23], three fingers method [24], boley gauze [6, 20], digital vernier caliper [1, 16, 25, 26] are popularly used methods to record the mouth opening. In the present study, the investigators used tongue depressor against the maxillary central incisor

and marked the point in tongue depressor where the mandibular incisor was wide open. This was done to avoid contamination. A single pair of disposable gloves was also used for an individual. One of the limitations of this study was that it was hospital-based study and conducted in Chitwan hence, the results cannot be generalized.

CONCLUSION

This study concluded that the mean inter-incisal distance was more among male students. Among the participants, on the basis of religion, Muslim students had maximum inter-incisal length followed by Buddhists, Hindus and Christians. On basis of ethnicity the maximum inter-incisal distance was in Chhetris and minimum in Newar students.

ADDITIONAL INFORMATION AND DECLARATIONS

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Data Availability: Data will be available upon request to corresponding authors after valid reason.

REFERENCES

1.Joshi U, Poudyal S, Hekka S, Lawaju N, Pradhan M. Maximum mouth opening of children in Newari population of Bhaktapur. Journal of Chitwan Medical College. 2021;11:88-91.
2.Patel SM, Patel NH, Khaitan GG, et al. Evaluation of maximal mouth opening for healthy Indian children: Percentiles and impact of age, gender, and height. Natl J Maxillofac Surg. 2016;7:33-8.
3.Inada E, Saitoh I, Nakakura-Ohshima K, et al. Association between mouth opening and upper body movement with intake of different-size food pieces during eating. Archives of oral biology. 2012;57:307-13.
4.Wood G, Branco J. A comparison of three methods of measuring maximal opening of the mouth. Journal of Oral Surgery (American Dental Association: 1965). 1979;37:175-7.
5.Khare N, Patil SB, Kale SM, et al. Normal mouth opening in an adult Indian population. Journal of maxillofacial and oral surgery. 2012;11:309-13.
6.Yao K-T, Lin C-C, Hung C-H. Maximum mouth opening of ethnic Chinese in Taiwan. Journal of Dental Sciences. 2009;4:40-4.
7.Cox SC, Walker DM. Establishing a normal range for mouth opening: its use in screening for oral submucous fibrosis. British Journal of Oral and Maxillofacial Surgery. 1997;35:40-2.
8.Buschang PH, Throckmorton GS, Travers KH, Hayasaki H. Incisor and mandibular condylar movements of young adult females during maximum protrusion and lateratrusion of the jaw. Arch Oral Biol. 2001;46:39-48.
9.Travers K, Buschang P, Hayasaki H, Throckmorton G. Associations between incisor and mandibular condylar movements during maximum mouth opening in humans. Archives of Oral Biology. 2000;45:267-75.
10. Dijkstra PU, Hof AL, Stegenga B, de Bont LG. Influence of mandibular length on mouth opening. J Oral Rehabil. 1999;26:117-22.
11. Sridhar M, Jeevanandham G. Clinical measurement of maximum mouth opening in children and its relation with different facial types. Drug Invention Today. 2018;10.
12. Rothenberg LH. An analysis of maximum mandibular movements, craniofacial relationships and temporomandibular joint awareness in children. Angle Orthod. 1991;61:103-12.
13. Naeije M. Local kinematic and anthropometric factors related to the maximum mouth opening in healthy individuals. J Oral Rehabil. 2002;29:534-9.
14. Muto T, Kanazawa M. The relationship between maximal jaw opening and size of skeleton: a cephalometric study. Journal of oral rehabilitation. 1996;23:22-4.
15. Kumar A, Dutta S, Singh J, et al. Clinical measurement of maximal mouth opening in children: a pioneer method. J Clin Pediatr Dent. 2012;37:171-5.
16. Koruyucu M, Tabakcilar D, Seymen F, Gençay K. Maximum mouth opening in healthy children and adolescents in Istanbul. Dentistry. 3000 2018;6.
17. Fatima J, Kaul R, Jain P, et al. Clinical Measurement of Maximum Mouth Opening in Children of Kolkata and Its Relation with Different Facial Types. J Clin Diagn Res. 2016;10:ZC01-5.
18. Gallagher C, Gallagher V, Whelton H, Cronin M. The normal range of mouth opening in an Irish population. J Oral Rehabil. 2004;31:110-6.
19. Moosa ZH, Slihem AG, Junaidallah AA, et al. Maximum mouth opening and its association with gender, age, height, weight, body mass index, and systemic disease in adult Saudi population: A cross-sectional study. Journal of International Oral Health. 2020;12:173.
20. Li XY, Jia C, Zhang ZC. The normal range of maximum mouth opening and its correlation with height or weight in the young adult Chinese population. J Dent Sci. 2017;12:56-9.
21. Oginni FO, Akinyemi JO, Bamgbose BO, et al. A pilot study of the maximum interincisal distance among adult Northern and Southern Nigerians. Nigerian Journal of Basic and Clinical Sciences. 2019;16:24.
22. Al-Dlaigan YH, Asiry MA. Maximum mouth opening in saudi adolescents. J Int Oral Health. 2014;6:45-9.
23.Müller L, van Waes H, Langerweger C, Molinari L, Saurenmann RK. Maximal mouth opening capacity: percentiles for healthy children 4–17 years of age. Pediatric Rheumatology. 2013;11:17.
24. Agrawal J, Shenai PK, Chatra L, Kumar PY. Evaluation of normal range of mouth opening using three finger index: South India perspective study. Indian Journal of dental research. 2015;26:361.
25. AlHammad ZA, Alomar AF, Alshammeri TA, Qadoumi MA. Maximum mouth opening and its correlation with gender, age, height, weight, body mass index, and temporomandibular joint disorders in a Saudi population. Cranio. 2019:1-7.
26. Chen HS, Yang PL, Lee CY, Chen KK, Lee KT. Analysis of maximum mouth opening and its related factors in 3- to 5-year-old Taiwanese children. Odontology. 2015;103:84-8. fhfd