

REVIEW ARTICLE

Maximum Mouth Opening among Libyan Population

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Abstract

Restricted mouth opening may be associated with musculoskeletal disorder or due to orofacial infections and trauma, as well as chronic condition such as disorders of the temporomandibular joint and tumors.

Aim: This study was aimed to measure the maximum mouth opening among the young healthy patients of Sirte city.

Methods: A total of 100 participates, 42 males and 58 females, in the age range of 12-20 years attending the orthodontic clinic in Sirte city were studied. The participates were asked to open their mouth maximally until no further opening was possible. The distance from the incisal edge of the upper incisor teeth to the incisal edge of the lower incisor teeth was measured using a digital calibrated. All data were analyzed using SPSS program and simple descriptive statistics of MMO with regard to gender and age were reported.

Results: The mean maximal mouth opening for males was 49.35 (4.5) mm and mean maximal mouth opening for females was 47.11 (4.7) mm. Mouth opening differences among different gender was compared which showed male had wider mouth opening but the difference was not statistically significant. Statistically significant differences were found between age groups.

Conclusions: The results of this study indicated that the positive relationship between MMO and age and the base line data was achieved in our study which needs to be validated further by conducting study in larger population.

Keywords: Gender; Age; Maximum Mouth Opening; Sirte city

Introduction

Mouth opening is an everyday activity which plays a vital role for mastication and speech and it is a clinical parameter, which we encounter routinely in our daily practice. A known normal range of mouth opening is necessary to enable the clinician conduct a thorough oral examination conveniently. Maximum mouth opening (MMO) has been defined as “the greatest distance between two central incisors (maxillary and mandibular) at the midline when measured from their incisal edges during the possible widest opening of the mouth” [1]. A reduced mouth opening capacity may be one of the first clinical signs of pathological changes and traumatic conditions in the masticatory system [2].

Limitation of mouth opening is associated with a number of clinical conditions ,such as dental infections, advanced stage of malignancies, fractures and myopathies in the head and neck region, TMJ dysfunction syndrome and many other reasons may contribute to the cause of reduced mouth opening [2]. Reduction in mouth opening may cause masticatory and social problems, it can also be an obstacle in the dentist’s office [3].

As an important step, before diagnosing that a person is suffering from limited mouth opening, it is necessary to acknowledge normal opening of the population [4,5]. Previous studies [6-10] examined the possible relationships between MMO and gender, age, weight, height or facial types. These studies investigated MMO among different populations; the variation in the range of MMO was reported. Further, most of these studies revealed that the females have a decreased mouth opening compared to males and the mouth opening increases with age until adulthood.

Clinical measurement of normal range of MMO is an important diagnostic tool for evaluation of stomatognathic system, especially in those who have suspected temporomandibular dysfunctions and neurogenic dysfunctions. Early recognition of decreased or limited mouth opening is necessary for a prompt and efficient approach to diagnosis and to plan out the treatment options judiciously [4]. We planned this study to measure the maximum mouth opening among the young patients in Sirte, Libya, because we do not have baseline data related to young patients as well as the importance of this subject derived us to this study.

Materials and Methods

A cross-sectional study, a total of 100 healthy participants (42 males and 58 females) aged 12-20 years with a (mean 15.8 ± 1.8 years) were randomly selected and examined. Participants having fully erupted maxillary and mandibular central incisors and able to understand and cooperate with the investigators were included in the study while the patients with missing maxillary or mandibular incisors, history of bruxism , attrition incisors or fractured crowned , participants with signs and symptoms of temporomandibular joint disorders were excluded from the study. Verbal consent was obtained from both parents and patients before initiating the study. The participants were informed that no incentives would be provided for participation in the study and that their personal data would not be disclosed. A preform containing the socio-demographic (age, gender) information of the participants was filled (Table 1).

Variable	N (%)
Age	
2-14 years	30(30.0%)
15-17 years	34(34.0%)
18-20 years	36(36.0%)
Mean (SD)	15.8 (1.8)
Gender	
Male	42(42.0%)
Female	58(58.0%)

Table 1: Socio-demographic data for study sample (N=100)

Record Analysis

The examination and measurements were performed while the subjects were seated comfortably in the dental chair in an upright position. Maximum opening, right-left excursion, protrusive movement were determined with electronic digital caliper by only one operator who was previously calibrated to do these procedures of same manner (Figure 1).

MMO was recorded by asked each subject to open his or her mouth as wide as possible while the examiner measured the maximum distance from the incisal edge of the maxillary central incisors to the incisal edge of the mandibular central incisors at the midline incisor during maximal mouth opening up to the painless limit (Figure 2).



Figure 1: Digital Vernier caliper

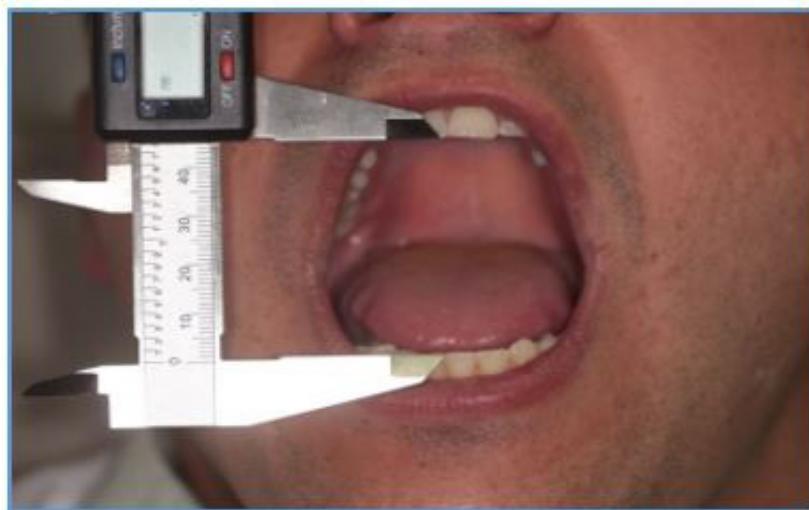


Figure 2: Measurement of maximum mouth opening done with the digital Vernier caliper

Statistical Analysis

Statistical analysis was conducted using the Statistical Package for the Social Sciences (Version 16.0; SPSS Inc., Chicago, IL, USA), mean and standard deviations were determined. Simple descriptive statistics of MMO with regard to gender and age groups were reported independent “t” test one-way ANOVA. $P < 0.05$ values were considered statistically significant.

Results

Among the participants, 42 (42.0%) were male while 58 (58.0%) were female. Among the participants, 27 (27.0%) were 12-14 years, 59 (59.0%) fall under 15-17 years and 14 (14.0%) fall under 18-20 years old group. The mean maximum mouth opening seen was 49.35(4.5) mm 47.11(4.7) mm in male and female respectively. Mouth opening differences among different gender were compared which showed male had wider mouth opening but the difference was not significant P - value = 0.019. Descriptive statistics of the subjects are shown in (Table 2) and (Figure 3).

Variable	Mean MMO (mm)	P- value
Male	49.35(4.5)	NS*
Female	47.11(4.7)	

MMO: Maximum mouth opening.

*t- test; NS = Non-significant.

Table 2: Mean maximum mouth opening in different gender



Figure 3: Mean maximum opening (mm) by gender

Regarding the age of participates, the mean maximum mouth opening in 12 to 14 years age group was 45.10 mm, 15 to 17 years age group was 47.37 mm, and 18 to 20 years age group was 51.60 mm is illustrated in (Table 3, Figure 4). There was significant difference in the mouth opening of different age groups.

Age group	N %	Minimum	Maximum	Mean MMO
12 - 14 years	27 (27.0%)	38.00mm	57.29mm	45.10mm
15 - 17 years	59 (59.0%)	38.44mm	58.22mm	47.37mm
18 - 20 years	14 (14.0%)	43.35mm	59.55mm	51.60mm

Table 3: Age of participates, the mean maximum mouth opening in 12 to 14 years age group

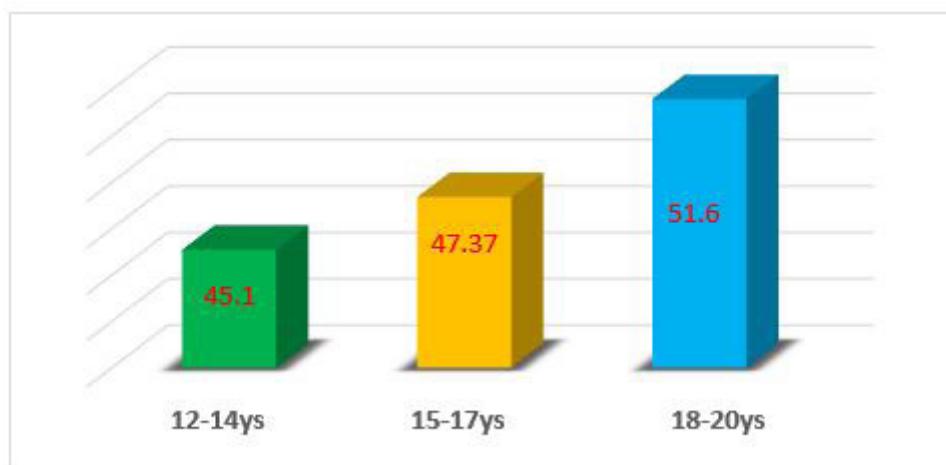


Figure 4: Mean maximum opening MMO (mm) by age groups

Discussion

Mouth opening is the marker for a number of pathological entities affecting the masticatory system. Patients with dental infection, temporomandibular joint diseases, craniofacial syndromes, maxillofacial trauma, oral malignancies and those who have been treated for these conditions often have complaint of restricted mouth opening. Limited mouth opening makes it difficult to perform various dental treatment procedures. It may also cause discomfort to patients undergoing prolonged dental treatment.

MMO has been measured either as inter-incisal distance [7,11,12] or as inter-incisal distance plus overbite [3]. There are various methods to measure MMO. Further, MMO has been determined either by using a ruler/caliper [7,13] or by using the width of three/four fingers [10,14]. Wood et al. [1] compared different measurement types and suggested that direct measurements using a ruler or caliper were more accurate and precise. Some studies [11,15], performed MMO measurement more than once and recorded the highest value while other studies [12,13] performed it once. In contrast, Yao et al. [11] displayed that the first measurement of MMO was generally the greatest among the three measurements taken for each subject, and this is due to decreasing muscle power with succeeding measurements. Hence, MMO was measured in the present study with an electronic digital caliper between the incisal edge of the maxillary central incisors and the incisal edge of the mandibular central incisors (inter-incisal distance) during MMO, and the first measurement of MMO was recorded.

In this study, all subjects were placed in a vertical position for measuring in order to eliminate the possible influence of different head positions, because the most important factor in measuring MMO is the head position. Higbie et al. [16] described short-term alterations in head position have a significant effect on the amount of MMO in a normal population.

Studies have reported that gender and age were significant factors associated with the MMO. The present study showed that the means of maximum mouth opening seen in male is 49.35(4.5) mm and in female is 47.11(4.7) mm which indicated it is not much difference among the gender. There was no statistically significant difference of MMO according to gender. These findings

were like to the results of other studies [5-9], assessed the MMO among different populations. Only few researches performed on maximum mouth opening have shown differences between male and females in their studies [17,18]. These variations could be due to the differences in sample size, conducted methodology, age, or could be explained by the existence of differences in anatomic characteristics of these populations.

Previous studies [2,11,14,19] documented a gradual increase in MMO with age, Müller et al. [19] pointed out that the increase of MMO with age in children and adolescents is partly explained by mandibular growth and sexual maturity. This may explain the results of the present study, which show that the means MMO at the age of 12-14 years, 15-17 years, and 18-20 years were 45.10 mm, 47.37 mm, and 52.60 mm, respectively. However, we observe there was a significant increase in MMO with age, regardless of gender. This is in agreement with the findings of previous studies [2,11] conducted in young population.

It is important to establish normal MMO for each specific population in order to be able to make a diagnosis of reduced mouth opening. Therefore, the results of the present study will be of a useful guide for diagnosis of numerous diseases related to the function of the masticatory system affecting mouth opening.

Despite the response rate in the present study, there were some potential limitations that should be taken in consideration. The limitation of the study is the sampling technique as we are using convenience sampling method here and the sample was restricted to those coming into our private clinic. So the sample size was small and that's why we cannot generalize the results. Therefore, population-based studies are needed to assess, in greater detail. Nevertheless, despite these limitations, this study provides valuable baseline information on the MMO among young population in Sirte, Libya.

Conclusion

The maximum mouth opening in males were slightly large than females, also the MMO, increased significantly with age. The base line data was achieved in our study which needs to be validated further by conducting study in larger population.

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