Factors affecting Maximum Mouth Opening In an Ethnically-Heterogeneous population: What is the new normal?

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Introduction

- Trismus has been known to reduce masticatory efficiency, oral hygiene, and cohesive bolus formation especially in the head and neck population.[1]
- A maximal mouth opening (MMO) of < 35 mm is used in the diagnosis of trismus regardless of age, height, weight gender or ethnicity. MMO is defined as the interincisonal distance.
- Given the relative importance of MMO to masticatory function, the demographic variation of MMO in an ethnically-diverse population remains unstudied..
- Other studies have suggested the ability to place 3-4 fingers vertically between the frontal incisors (MMOfingers) as a subjective measurement of MMO. We sought to investigate this in our healthy, ethnically-diverse population of 330 participants.

Objective

- **Aim 1:** To determine the relationship between the demographic factors of age, gender, height and weight and maximum mouth opening in an ethnically- heterogeneous population of 330 participants.
- **Aim 2:** To report normative values of average maximum mouth opening as a function of Body Mass Index (BMI).

Participants

330 participants (171 males, 159 females, Range: 18 - 86 years; Mean ± SD: 42.13 ± 18.53 years) completed the study.

Exclusionary criteria:

- A history of head and neck cancer
- A disorder of the temporomandibular joint
- A history of paresis, paralysis or previous trauma in the head or neck
- A history of any surgery that would impact jaw range of motion
- Had braces (currently), implants, or dentures

Methods

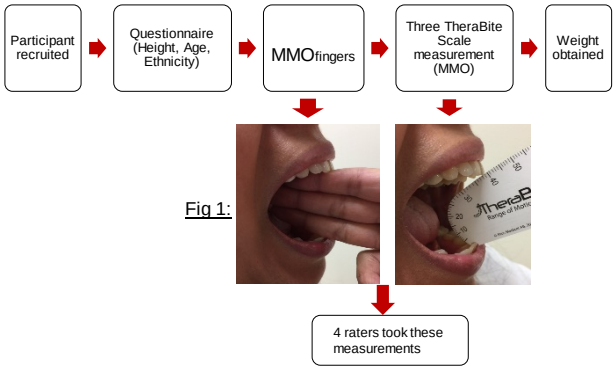


Fig 1:

Results

Statistical Analysis

A multiple backward step-wise regression model was used to determine the relationship between the demographic variables (age, gender, height, and weight) and MMO.

Relationship between demographic factors and MMO

- Age, weight and height are significant predictors of MMO (Table 1).
- These factors account for 20% of the variation in MMO. (Adjusted R squared = 0.208, F (3,326) = 29.731,P = 0.001)

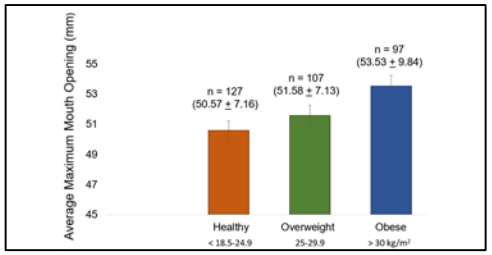
Predictor	*Beta Coefficient*	*SE*	*t value*	*p value*
Height	.322	.096	5.812	.001*
Weight	.216	.010	3.765	.001*
Age	-.166	.020	-3.237	.001*

*All predictors are significant at p < .01.

Table 1: The statistical results of the final regression model. (Independent variable: MMO)

Normative values of average MMO as a function of BMI

As height and weight were significant predictors of MMO, we reported our normative for average MMO as function of the composite score of height and weight – Body Mass Index.



MMOfingers (Maximum Mouth Openings for Fingers)

Nearly 95% of the participants in our study successfully placed 3 or more fingers in their mouth.

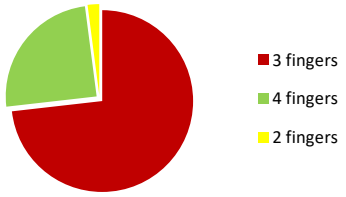


Fig 2: Pie chart of MMOfingers results

Discussion

Age

- MMO decreased with increasing age. This may be due to sarcopenia or age – related muscle atrophy in the lateral pterygoid muscle. [2,3]

Weight

- MMO increased with increasing weight. Other studies in ethnically homogenous populations have reported a potential association between MMO and weight.[6,8]

Height

- MMO increased with increasing height. Longer mandibular length has been associated with both increased MMO and increasing height and may contribute to this association.[4,5]

Gender

- Gender was not a significant predictor of MMO. Overwhelming evidence in ethnically-homogenous populations in children and adults have shown that males have greater MMO than females. Racial variation in MMO is generally independent of factors such as height and weight but not necessarily for gender. [4,7,8]

MMOfingers

- Given that 95% of participants in our study could successfully place 3 fingers in their mouth irrespective of their age, weight and height, this measure has potential in identifying normal maximum mouth opening in the absence of objective measurement tools.

Conclusions

- In the present study, we found that demographic factors such as age, height and weight were significant predictors of average Maximum Mouth Opening in an ethnically-diverse American population of 330 adults.
- Future research can identify if MMOfingers is sensitive in the diagnosis of trismus.

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