

## A Study of Range of Motion of Temporomandibular Joint in Adult Population of Western Rajasthan

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### Abstract

*Introduction:* The term goniometry refers to the measurement of angles created at human joints, it may be used to determine both a particular joint position and total amount of motion available at a joint. *Aim & Objectives:* The purpose of the study was to determine the effect of age and gender on movements of temporomandibular joint in 100 normal subjects through the Universal Goniometer. *Material & Methods:* Study was carried out on 100 healthy subjects aged between 20-30 years. All the subjects having normal temporomandibular joint skeleton were chosen and those who were not having any history of joint surgery, trauma or any other type of abnormalities were included for determining the validity and reliability of the goniometric measurements. *Results:* Male subjects showed higher range of motion for depression of mandible, anterior protrusion and lateral deviation than females. *Conclusion:* ROM in all active temporomandibular joint motions except retrusion decreases with increasing age. The males also had a greater mean ROM in right lateral deviation, but the difference between genders was small.

**Keywords:** Depression of Mandible; Anterior Protrusion; Lateral Deviation; Range of Motion.

### Introduction

The term Goniometry refers to the measurement of angles created at human joints, it may be used to determine both a particular joint position and the total amount of motion available at a joint. It is also used to accurately describe abnormal fixed joint positions. Osteokinematic motions are described as taking place in one of three cardinal planes of body (sagittal, frontal and transverse) around three corresponding axes (medial-lateral, Ant-post and vertical) [3].

The temporomandibular joint is a synovial, condylar, and hinge type joint. The temporomandibular joint as a whole allows motions in three planes around three axes. The functional motions permitted are mandibular elevation and depression,

protrusion and retrusion and lateral deviation.

Range of motion is the amount of motion available at a joint. The starting position for measuring all range of motion (ROM), except rotations in transverse plane is the Anatomical position. Three notation systems have been used to define ROM: the 0 - to 180 - degree system, the 180 - to 0° system and the 360 - degree system. First described by Silver [4] in 1923, its use been supported by many authorities.

The ROM at temporomandibular joint is affected by osteoarthritis, dislocation of mandible, dearrangement of articular disc. The type of motion available at a joint varies according to age, sex and the str. of joint. In the Temporomandibular joint dysfunction, a common disorder that affects more women than men, initially causes hypermobility of the joint but later may cause limitation of motion.

Thus the Determinants of Range of Motion are:-

- Shape of the Bone & cartilage
- Muscle power and tone
- Muscle Bulk
- Ligaments & joint capsule laxity
- Extensibility of the skin & subcutaneous tissue

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- Race (Indians are more mobile than Blacks, who are more mobile than Caucasians)
- Sex (women are more mobile than men)
- Age (Range of Motion decreases with age)
- Genetic make up

Day to day stresses on joints.

### Aims and Objectives

The purpose of this study is to determine the effect of age and gender on movements of Temporomandibular joint in 100 normal subjects through the ruler.

If in the history the patient has complained that certain loaded or combined movements (those movements giving resistance other than gravity) are painful, the examiner should not hesitate to carefully test these movements metrically to better ascertain the problem. If a neurological injury is suspected the examiner must carefully assess for muscle weakness to determine the structures injured. If a severe neuropraxia or axonotmesis has occurred, there may be residual weakness even though muscle atrophy is not as evident.

### Material and Method

The study has been carried out on 100 healthy subjects aged between 20-30 years. All the subjects having normal temporomandibular joint skeleton and not having any history of joint surgery, trauma or any type of abnormalities were included in this study. The subject's chosen for the study were evaluated and confirmed for the following data:

- They are residents of Rajasthan.
- They have authentic documentation of their date of birth (i.e. birth certificate, driving license, hospitals records etc.)
- *Goniometry*: The physical measurements of temporomandibular joint for determination of range of motion were carried out on same individuals by use of Ruler by us.

For Temporomandibular Joint:-

- a. Depression (Lower Jaw inferiorly) - Distance between Upper and Lower central Incisors.
- b. Protrusion (Mandibular teeth forwards) - Distance between Upper and Lower central Incisors.

- c. Lateral Deviation (Lower Jaw laterally) - Distance between Upper and Lower Cuspids.

The following items are recommended to be included in the recording:

1. Subject's name, age and gender.
2. Date of measurement
3. Type of Goniometer used.
4. Side of the body, joint and motion being measured for example left wrist flexion.
5. Type of motion being measured, that is, passive or active motion.
6. Any subjective information, such as discomfort or pain, which is reported by the subject during the testing.

Recordings should include both the starting and ending positions to define the ROM.

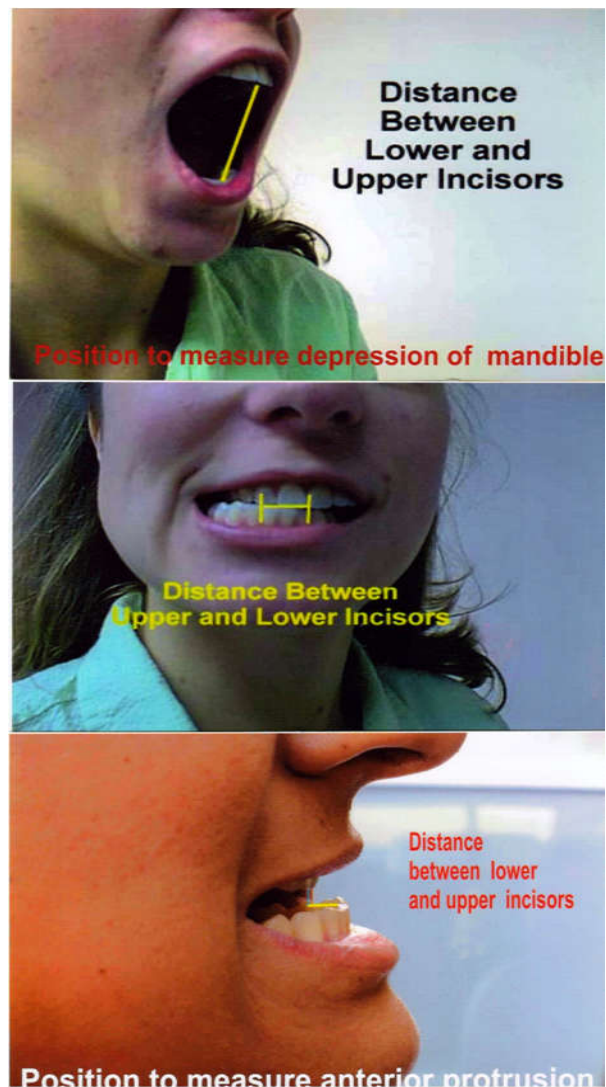
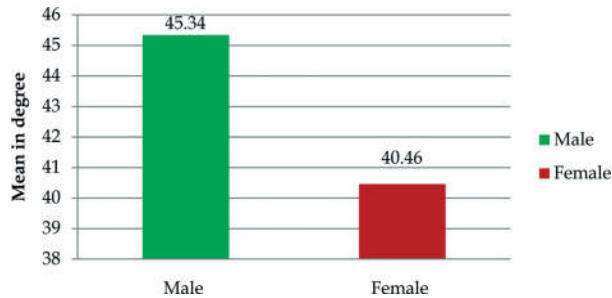


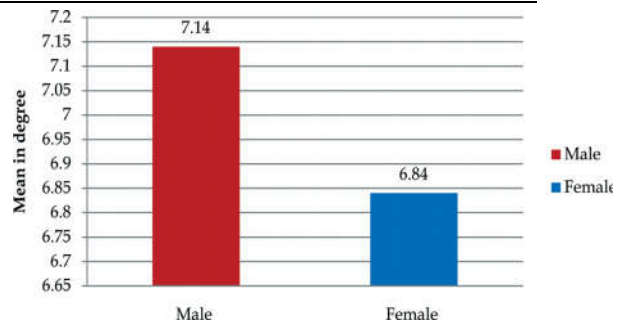
Fig. 1: Showing opening of mouth, lateral deviation and anterior protrusion

**Table 1:** Showing depression of lower jaw in age group 20-30 years

Sex	Number of subjects	Range (in mm)	Mean (in mm)	SD (in mm)
Male	50	40-55	45.34	4.38
Female	50	35-50	40.46	3.96



**Fig. 1:** Shows the relation of depression of Lower Jaw between male & female (age group 20-30 years)



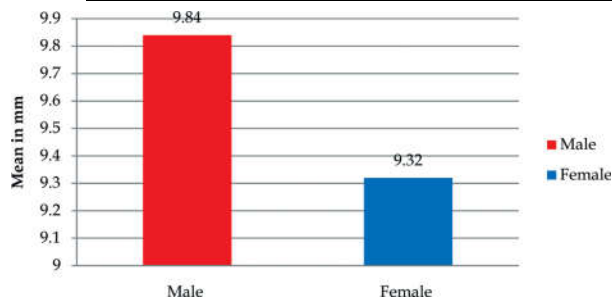
**Fig. 2:** Shows the relation of Anterior Protrusion of Lower Jaw between male and female (age group 20-30 years)

**Table 2:** Showing anterior protrusion of lower jaw in age group 20-30 years

Sex	Number of subjects	Range (in mm)	Mean (in mm)	SD (in mm)
Male	50	5-10	7.14	1.44
Female	50	4-9	6.84	1.42

**Table 3:** Showing lateral deviation of lower jaw in age group 20-30 years

Sex	Number of subjects	Range (in mm)	Mean (in mm)	SD (in mm)
Male	50	5-15	9.84	2.34
Female	50	5-12	9.32	1.99



**Fig. 3:** Shows the relation of Lateral Deviation of Lower Jaw between male and female (age group 20-30 years)

*Observations*

Showing Measurements of Motion at Temporomandibular Joint (in millimeter) By Plastic Ruler.

**Discussion**

Coordinated and parallel movements at the temporomandibular joint and cervical spine joints have been observed in some studies and researchers suggest that preprogrammed neural commands may simultaneously activate both jaw and neck muscles. In the temporomandibular disorders popping or clicking noises (or both) in the joint during mouth

opening and closing may be present. Other signs and symptoms include facial pain, muscular pain, tenderness in the region of the TMJ, either unilaterally or bilaterally, headaches and stiffness of the neck. Temporomandibular disorders (TMDs), appear to be more prevalent in females of all ages after puberty. The reason for this includes greater stress levels, hormonal influences, and habits of adolescent girls that are extremely harmful to the temporomandibular joints (eg. intensive gum chewing, continuous arm learning, ice crushing, nail biting, jaw play, clenching and bruxism). Seeing the importance of temporomandibular joint great emphasis has been given on studies of various parameters related to temporomandibular joint. The present study has been conducted on 100 subjects (50 male and 50 females) volunteered for Goniometric study and their age group ranged between 20-30 years. Regarding temporomandibular joint the parameters were opening, anterior protrusion and lateral deviation. Range, mean, standard deviation of all the parameters was calculated.

*Temporomandibular Joints*

*Depression of the Mandible: - (Mouth opening)*

In the present study the mean values of opening of mouth (Table 1) in age group (20 to 30 years) in males is  $45.34 \text{ mm} \pm 4.38 \text{ mm}$  and the range is from 40 to 55 mm in males. The mean values of opening of mouth in females are  $40.46 \text{ mm} \pm 3.96 \text{ mm}$  and the range is from 35-50 mm in females.

Magee (1997) [2] observed that the mandible is able to depress approximately 35 mm to 50 mm so that the subject's three fingers or two knuckles can be placed between the upper and lower central incisor teeth.

#### *Anterior Protrusion*

In the present study the mean values of anterior protrusion (Table 2) in age group (20 to 30 years) in males is  $7.14 \text{ mm} \pm 1.44 \text{ mm}$  and the range is from 5 to 10 mm in males. The mean values of anterior protrusion in females are  $6.84 \text{ mm} \pm 1.42 \text{ mm}$  and the range is from 4-9 mm in females.

Magee (1997) [2] observed that the movement of anterior protrusion is 3 mm to 6 mm measured from resting to the protruded position.

Walker (2000) [5] studied discriminative validity of temporomandibular joint range of motion measurement and gave Mean  $\pm$  SD of  $7.1 \pm 2.3 \text{ mm}$ .

#### *Lateral Deviation*

In the present study the mean values of lateral deviation (Table 3) in age group (20 to 30 years) in males is  $9.84 \text{ mm} \pm 2.34 \text{ mm}$  and the range is from 5 to 15 mm in males. The mean values of lateral deviation in females are  $9.32 \text{ mm} \pm 1.99 \text{ mm}$  and the range is from 5-12 mm in females.

AP Brady, L Mcdevil, JP Stack and D Downey (1993) [1] told that the amount of lateral movement to the right and left sides should be similar, between 10 & 12 mm but may range from 6 mm to 15 mm.

#### **Conclusion**

On the basis of present study we can say that the range of motion is affected by various factors such as age, gender, measuring method, type of range of motion (active or passive) and clinically problems.

ROM in all active TMJ motions except retrusion decreases with increasing age. The males also had a greater mean ROM in right lateral deviation, but the difference between genders was small.

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