

# Prevalence of Signs of Temporomandibular Joint Dysfunction in Asymptomatic Edentulous Subjects: A Cross-Sectional Study

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**Abstract** Patients having complete dentures with reduced vertical dimension generally do not manifest Temporomandibular Joint problems. It is not understood as to why the closure of jaws in dentulous individuals can predispose to Temporomandibular Joint problems, while the same etiology in edentulous subjects does not cause any concern. This study was planned to find out the prevalence of various Temporomandibular Joint dysfunction signs in subjects who were edentulous for a period of 6 months to 2 year. The various signs were obtained from a population of 100 healthy asymptomatic edentulous subjects by a questionnaire and then were clinically examined for the presence or absence of signs of Temporomandibular Joint dysfunction. 59% of the subjects exhibited one or more signs of Temporomandibular Joint dysfunction, 41% of the subjects did not show any signs of Temporomandibular Joint dysfunction. 56.6% of males reported signs of Temporomandibular Joint dysfunction when compared with females which was 62.5%. 43.3% of males did not show any signs of Temporomandibular Joint dysfunction when compared with those of the females which was 37.5%. The number of subjects who showed two signs was 29%, subjects who had only one sign was 25%. It was found that dysfunction was prevalent among both men and women in more than half of the asymptomatic subjects examined. 59% had one or as many as three signs of Temporomandibular dysfunction. The most commonly seen Joint dysfunction was the joint sounds which was 47%

**Keywords** Prevalence · Temporomandibular joint · Dysfunction · Signs · Edentulous

## Introduction

Edentulous subjects generally do not present with Temporomandibular Joint dysfunction symptoms to the extent of those having natural dentition. This is probably because the proprioceptive feed back from teeth no more exists to initiate the symptom complex of Temporomandibular Joint disorder. In persons having natural teeth it is believed that overclosure of the jaws can predispose to Temporomandibular Joint dysfunction as originally postulated by Costen [1]. However this contention is disputable in edentulous persons who have had long standing edentulous period and have not worn any dentures. In spite of the overclosure of edentulous jaws during mastication they seldom develop Temporomandibular Joint disorders. Likewise patients having complete dentures with reduced vertical dimension generally do not manifest Temporomandibular Joint problems. It is not understood as to why the closure of jaws in dentulous individuals can predispose to Temporomandibular Joint problems, while the same etiology in edentulous subjects does not cause any concern.

Meyerowitz [2] however reported that thirty two percent of one ninety completely edentulous patients who had not complained of any TMJ pain dysfunction presented pain on palpation of muscles of mastication. Therefore many of the edentulous patients who do not complain about Temporomandibular Joint dysfunction on a random examination may show one or more signs of it. Since it is possible that these signs could develop into a recognizable Temporomandibular Joint dysfunction at a later period, an early recognition of these signs is therefore beneficial.

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## Aims and Objectives

1. To determine the prevalence of various Temporomandibular Joint dysfunction signs in subjects who were edentulous for a period of 6 months to 2 years.
2. To determine which sign was most commonly seen in these edentulous subjects.

## Materials and Methods

This cross-sectional study was conducted to find the prevalence of signs of Temporomandibular Joint dysfunction in a population of healthy asymptomatic edentulous subjects. All the subjects involved did not complain of any Temporomandibular Joint dysfunction.

The various signs are obtained from them by a questionnaire and a detailed clinical examination was conducted.

The sample comprised of 100 edentulous subjects who reported to the Prosthodontics department of Yenepoya dental college, Mangalore.

### The Criteria for Selection of Subjects

The sample consists of non denture wearers who are completely edentulous, without any root stumps and are in the age group between 45 and 75 years.

These samples are totally edentulous for a post extraction period of 6 months to 2 years.

They are unaware and without any previous history of signs of Temporomandibular Joint dysfunction.

The investigation is conducted as follows:

### Examination of Subjects for the Presence of Temporomandibular Joint Dysfunction

Since the subjects included in the study are asymptomatic subjects, they did not express any Temporomandibular Joint dysfunction.

During the course of examination each of the subjects are interrogated and later clinically examined for the presence of any signs of dysfunction.

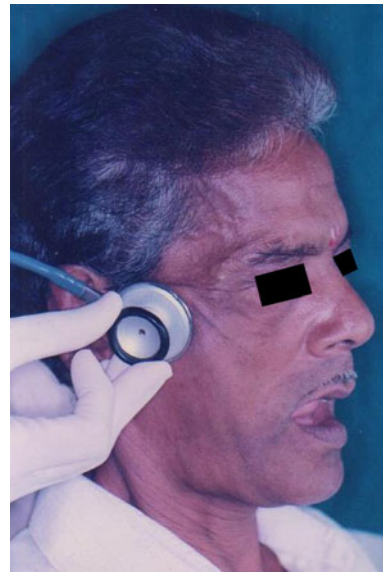
The examination will be conducted as follows:

1. Joint sounds: Observed by hearing and auscultation (Fig. 1).

The sounds are classified as: (A) Crepitus, (B) Clicking

2. Muscle tenderness

Tenderness of the muscles of mastication and neck muscles are elicited by the method advocated by Bell, Friedman and Gray [3]



**Fig. 1** Auscultation of joint area to detect clicking and crepitus



**Fig. 2** Palpation of temporalis muscle to elicit tenderness

### Temporalis

The temporalis muscle is palpated extraorally by asking the subject to close the mouth against resistance. Digital palpation is performed with four fingers placed on anterior, middle and posterior fibres of the muscle. The insertion of temporalis tendon is palpated intraorally by running the little finger up the anterior border of the ascending ramus where the tendon inserts into the coronoid process (Fig. 2).



**Fig. 3** Palpation of medial pterygoid muscle to elicit tenderness

#### Medial Pterygoid

This muscle is palpated intraorally. The finger is inserted medially to the pterygomandibular raphe and the muscle is pressed laterally against the inner surface of the mandibular ramus, to elicit tenderness (Fig. 3).

#### Lateral Pterygoid

By placing pressure with the index finger in an upward direction on the distobuccal aspect of the tuberosity, the belly of the muscle is palpated.

Since this area is difficult to access it is more accurately examined by the functional manipulation technique.

##### A. Resisting opening

The operators hand is placed under the subjects chin. The subject opens the jaw slightly as the operator gradually applies a strong closing force to the chin (Fig. 4).



**Fig. 4** Palpation of lateral pterygoid muscle to elicit tenderness by resisting lateral excursion



**Fig. 5** Palpation of lateral pterygoid muscle to elicit tenderness by resisting mouth opening

##### B. Resistive lateral excursion

Force is applied to the subjects right jaw (lateral resistive test) as the subject resists a strong lateral force. This stresses the lateral pterygoid muscle on the subjects left side. Similarly force is applied to the subjects left jaw to stress the right lateral pterygoid muscle (Fig. 5).

#### Masseter

The masseter muscle is palpated bimanually. The anterior border of the muscle is palpated with one finger inside the buccal vestibule. The remainder of the muscle is pressed



**Fig. 6** Palpation of masseter muscle to elicit tenderness



**Fig. 7** Palpation of the joint to elicit tenderness through lateral side of the joint

directly against the mandibular ramus. The finger is moved with slight pressure in an upward and downward manner to elicit tenderness (Fig. 6).

**3. Joint Tenderness**

Palpation of the lateral side of both the joints (Fig. 7) as well as palpation through external auditory meatus (Fig. 8) is done to elicit tenderness.

The subjects are also observed for any sign of referred pain during opening or closing of the mouth.

**4. Deviation of Mandible on Mouth Opening**



**Fig. 8** Palpation of the joint to elicit tenderness through external auditory meatus

The subjects are asked to gently open the mouth and then examined for any deviation of the mandible, while closing.

**5. Limitation during mouth opening is also examined.**

As a routine these subjects are also examined to exclude any signs of sinus problems associated with TMJ disorder.

The clinical examination is done in this manner for all the 100 edentulous subjects and the result thus obtained is tabulated for further analysis.

**Results**

The data's are presented in Tables 1, 2, 3, 4

Table 1 shows the number and Sex distribution of subjects experiencing Temporomandibular

Joint dysfunction in 100 edentulous subjects.

It was seen that 59% of the subjects exhibited one or more signs of Temporomandibular Joint dysfunction and 41% of the subjects did not show any signs of Temporomandibular Joint dysfunction. 56.6% of males reported

**Table 1** Number and sex distribution

	Men	Percentage	Women	Percentage
With signs	34	56.6	25	62.5
Without signs	26	43.3	15	37.5
Total	60		40	

**Table 2** Subjects showing one or more signs of TMJ dysfunction

No of signs	Males	Females
One sign	12	13
Two signs	13	16
Three signs	1	2
More than three signs	2	Nil

**Table 3** Order of prevalence of TMJ signs in edentulous asymptomatic subjects

No	Signs	No of individuals	Percentage
1	Joint sounds	47	47
2	Deviation of mandible	43	43
3	Muscle tenderness	9	9
4	Joint tenderness	3	3
5	Pain during mouth opening	Nil	Nil
6	Limitation on mouth opening	Nil	Nil
7	Referred pain	Nil	Nil

**Table 4** Age distribution of samples

Age	No of subjects	Percentage
45–50 years	28	28
51–55 years	18	18
56–60 years	30	30
61–65 years	16	16
66–70 years	4	4
71–75 years	4	4

signs of Temporomandibular Joint dysfunction when compared with females which was 62.5%.

43.3% of males did not show any signs of Temporomandibular Joint dysfunction when compared with those of the females which was 37.5%.

Table 2 shows the number of subjects having one or more signs of Temporomandibular Joint dysfunction.

The maximum number of subjects who showed two signs was 29%. This was followed by subjects who had only one sign which was 25%. The number of subjects who had three signs was only 3% and subjects who had more than three signs were 2%.

Table 3 shows the order of prevalence of various dysfunction signs.

The most commonly seen dysfunction were the joint sounds 47%, deviation of mandible 43%, muscle tenderness 9%, joint tenderness 3%, pain on mouth opening 1%. Signs of referred pain and limitation on mouth opening were not exhibited by any of the subjects.

Table 4 shows the age distribution of the subjects showing signs of Temporomandibular Joint dysfunction.

The maximum numbers of subjects seen were in the age group between 56 and 60 years which was 30%. Subjects seen between the age group of 45 and 50 years was 28%. 18% of the subjects were in the age group between 51 and 55 years. 16% of the subjects were in the age group between 61 and 65 years. Only 4% were in the age groups between 66–70 years and 71–75 years.

## Discussion

The Temporomandibular pain dysfunction syndrome as described by Schwartz [4] is primarily a symptom complex which is seen in young or middle aged adults. Some of the signs are tenderness of the joint, dull pain which increase on mouth opening, muscle tenderness, referred pain to the angle of mandible and muscles of the neck, limited mouth opening, deviation on mouth opening and joint sounds characterized by crepitus and clicking.

Emotional tension and occlusion play a definite etiological role to produce muscle spasm which triggers these

symptoms. Several opinions are expressed in the literature whether occlusion is the cause or the result of the dysfunction or vice versa. Many generally dispute the primary role of occlusion, but believe that malocclusion is the result consequent to dysfunction. If this is to be discussed in the light of complete denture patient, it can be argued as follows, firstly whether malocclusion in complete denture can predispose to dysfunction. Complete denture function differently from that of natural dentition. When malocclusion common to edentulous subjects such as centric prematurity is present, the reactions are displacement of the denture base, sore spots in the alveolar ridge and resorption of the ridges. Centric prematurities do not trigger any proprioceptive response to produce Temporomandibular Joint dysfunction. On the contrary the immediate result of centric prematurity is displacement of the denture which acts as a buffer to the Temporomandibular Joint from dysfunction.

The other type of malocclusion common to complete denture wearers is an increase or decrease in vertical dimension. Increase in vertical dimension by faulty dentures in addition to its deleterious effect on the ridge produces strain of the musculature because of overextension of the closing muscle of the jaws. Overclosure of the jaws was thought to produce Temporomandibular Joint problems in the past and these were designated as Costen's syndrome. However this theory of posterior displacement is today refuted.

This cross-sectional study was planned to ascertain various clinical signs of Temporomandibular Joint dysfunction in subjects who had an edentulous period of six months to two years.

On dentists examination however some of the signs such as tenderness of joints, pain on mouth opening, muscle tenderness, referred pain to the angle of mandible, deviation on mouth opening and joint sounds were detected in more than half of the subjects examined.

After the completion of examination in this manner it was found that 59% of the edentulous subjects exhibited one or more signs of dysfunction. Only 41% of the subjects did not show any signs of dysfunction. Females showed higher percentage of signs of dysfunction when compared to males.

Emotional tension is a common factor which should be reckoned in both dentulous as well as edentulous subjects. Anxiety and stressful conditions can cause clenching of the jaws and thereby overcontraction and fatigue of the masticatory muscles. This is the probable explanation for Temporomandibular Joint dysfunction signs in a denture wearer. Even though many may not complain of active signs of dysfunction, some harbor a few signs without being aware of it.

The number of subjects having one or more signs of dysfunction was also examined.

As regards the subjects exhibiting individual signs it was found that 29% of the subjects had two signs of dysfunction followed by 25% of subjects who had only one sign. The number of subjects who had three signs was only 3% and 2% of the subjects exhibited more than three signs of dysfunction.

According to the order of prevalence, the most commonly seen signs of dysfunction were joint sounds 47%, deviation of mandible 43%, muscle tenderness 9%, joint tenderness 3%, pain on mouth opening 1%. Signs of referred pain and limitation on mouth opening were not exhibited by any of these subjects.

The largest number of samples examined for signs of dysfunction was between the age group of 56–60 years and the least was seen in the age groups between 66–70 years and 71–75 years which was 4%.

The results of this study shows that in a very large proportion of edentulous subjects, more than 50% harbor in them some of the signs of Temporomandibular Joint dysfunction. This is indeed an alarming proportion. It is not clear whether some of these subjects had these signs existing in their dentition period or these signs developed after the extraction of all the teeth.

Since the periodontal proprioceptive trigger mechanism from natural teeth no more existed, it is probable that these signs were a result of overcontraction of the closing muscles caused either by overclosure of the jaws because of muscle contraction due to emotional tension in these subjects.

There is a general tendency for females to exhibit Temporomandibular Joint dysfunction more than their male counterparts. This study also showed that females show more Temporomandibular Joint signs than males.

These observations indicate that edentulous subjects do show one or more signs of dysfunction. If these signs were allowed to continue in these subjects they might lead to undesirable consequences in the occluso- temporomandibular joint complex.

#### Limitation of the Study

A longitudinal follow up study is desirable to know the course of these signs

#### Summary and Conclusion

This investigation was conducted on healthy, asymptomatic edentulous subjects to ascertain the prevalence of signs of Temporomandibular Joint dysfunction.

The sample consisted of 100 edentulous non denture wearing subjects comprising 60% males and 40% females in the age group of 45–75 years.

These subjects were examined for the presence of signs of Temporomandibular joint dysfunction such as joint sounds, joint tenderness, pain on mouth opening, muscle tenderness, deviation of the mandible on mouth opening, limitation during mouth opening and referred pain.

1. More than half of the asymptomatic subjects had signs of Temporomandibular Joint dysfunction and they were unaware of these, 59% of the subjects exhibited one or more signs of Temporomandibular Joint dysfunction.
2. Females (62.5%) showed more prevalence of Temporomandibular Joint dysfunction than males (56.6%).
3. All the cardinal signs of Temporomandibular Joint dysfunction were seen in varying extent. Among these joint sounds were seen in 47%, deviation of mandible in 43%, muscle tenderness in 9%, joint tenderness in 3% and pain during mouth opening in 1%. None of these subjects complained of limitation of mouth opening or had any sign of referred pain.
4. 5% of the subjects showed three or more than three signs of Temporomandibular Joint dysfunction.

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