SUMMARY
The temporomandibular joint is the only moveable joint in the head. It comprises the upper and lower articular surfaces, the articular disc, the articular capsule and the ligaments. The physiologically optimal skeleton relation of the articular surfaces implies that the condyles are located in the highest anterior position in the articular fossae with regularly interposed discs between the articular surfaces. The X-ray analysis was used to determine the inter-relation between the upper and lower articular surfaces of the temporomandibular joint in the totally edentulous patients with the symptoms of the temporomandibular dysfunction. The patients who came for treatment at the Clinic for Dental Prosthodontics of the School of Dentistry in Sarajevo were included in the research. The sample involves edentulous patients of both sexes at the age of 50-60 with eugnate relation of the jaws. The patients with complete edentia in the upper and lower jaws were divided into two groups—the totally edentulous patients with the symptoms of the temporomandibular dysfunction and the totally edentulous patients being free of symptoms of the temporomandibular dysfunction. All the patients included in this research underwent the following: anamnesis, a detailed clinical examination, X-ray examination of the right and the left temporomandibular joint, X-ray analysis and linear measurements of the range of the articular surfaces on the X-rays. X-rays of the temporomandibular joint were taken in the position of central occlusion. The totally edentulous patients with the symptoms of the temporomandibular dysfunction in the position of the central occlusion have the non-physiological position of the condyles in the mandibular fossa in relation to the totally edentulous patients who did not suffer the aforementioned symptoms.

Keywords: totally edentulous, temporomandibular dysfunction, joint space, condyle position

1. INTRODUCTION
The temporomandibular joint is the only moveable joint of the head and it is composed of the upper articular surface, the lower articular surface, the articular disc, the articular capsule and the articular ligaments. The physiologically optimal skeletal relation between the joint components implies that the condyles are located in the highest anterior position in the mandibular fossa with regularly interposed discs between the articular surfaces (1,2). The previous radiographic researches indicate that in patients with symptoms of temporomandibular dysfunction and in those being free from the said symptoms the anterior, centric and posterior condyle position in mandibular fossa was noticed (3,4). The factor which plays a dominant role in determining the area position of the articular surfaces are the two antagonizing dental arches; their ultimate relation determines the definite area relation of the cranio-mandibular relationship. In totally edentulous patients as well as in a great number of patients with partial edentulation, and sometimes, in patients with full dental arches but with morphologically altered occlusion surfaces, the mandibular assumes a new position in the area—when this position is analysed in respect of the relation of the articular surface of caput mandibulae to facies articularis fossae mandibularis is non-physiological (5,6,7).

2. AIM OF THE STUDY
The aim of the study was to determine in totally edentulous patients with symptoms of temporomandibular dysfunction, by using the radiographic analysis, the interrelation of the upper and lower articular surface of the temporomandibular joint in the position of central occlusion and compare it with the same interrelation of the articular surfaces in totally edentulous patients without signs of TMD.

3. SUBJECTS AND METHODS
The present research involved the totally edentulous patients who came to the Clinic for Prosthodontics at the School of Dentistry of Sarajevo University to have their dentures made. The sample involved 80 patients of both sexes of the age ranging from 50 to 60. The subjects were divided into two groups:

The first group consisted of totally edentulous patients who, upon the examination, were diagnosed with the symptoms and signs of the TMD such as pain in the area...
of the temporomandibular joint, sound sensations (clicking and crepitations in the joint), the mandibular deviations at the opening and closing of the mouth, limited opening of the mouth, headache and tinnitus. This group involved 40 patients.

The second (control) group was also made up of totally edentulous patients, but they did not show either the symptoms or signs of the TMD. This group also involved 40 patients.

In all patients involved in the research a case history was taken accompanied by a detailed clinical intra-oral and extra-oral examination. After that the anatomical impression of the upper and lower edentulous jaws was taken, the elaboration of the working models, the elaboration of the individual spoons, and also taking of the functional impressions for each individual patient. After casting the functional impressions and the making of the definitive cast models the biting wax models were made for the upper and the lower jaws. By using the biting wax models in each patient and also the most typical intra-oral and extra-oral methods, the lower jaw was placed into the position of central occlusion in relation to the upper jaw. At this, it is important to stress that in all patients in this stage (with the biting wax models placed in the mouth and the position of jaws in the central occlusion) the X-rays of the right and the left temporomandibular joint were taken.

The radiography was performed by using Ortopantomograph® OP 100, Instrumentarium Imaging Producer (Finland), programme 6. In X-rays of the temporomandibular joint, which were obtained in the position of the central occlusion, the analysis of the interrelation between the articular surfaces was made and the linear measurements of the anterior and posterior joint space were carried out. The method previously described pursuant to Pullinger and Hollender (6) was adopted to evaluate the centric condyle position in the mandibular fossa. The percentage of the condyle displacement from the centric position is expressed as:

$$\text{CD} = \frac{(P-A)}{(P + A)} \times 100\%$$

**CD** – Percentage of the condyle displacement  
**P** – Posterior joint space  
**A** – Anterior joint space

If the **CD** value range is -12% and +12%, it is considered that the condyle has the centric position in the mandibular fossa. If the value is below – 12%, it is considered that the condyle has the posterior position; but if it is higher than + 12%, the condyle has the anterior position in the mandibular fossa.

### 4. RESULTS

The distribution of the various condyle positions in the mandibular fossa in patients with symptoms of temporomandibular dysfunction and patients without symptoms are shown in Table 1. The totally edentulous patients with conspicuous symptoms and signs of temporomandibular dysfunction has the posterior position, but if it is higher than + 12%, the condyle has the anterior position in the mandibular fossa.

<table>
<thead>
<tr>
<th>Condyle position</th>
<th>Totally edentulous patients with TMD symptoms</th>
<th>Totally edentulous patients without TMD symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Anterior</td>
<td>8 (20%)</td>
<td>7 (17.5%)</td>
</tr>
<tr>
<td>Centric</td>
<td>3 (7.5%)</td>
<td>24 (60%)</td>
</tr>
<tr>
<td>Posterior</td>
<td>29 (72.5%)</td>
<td>9 (22.5%)</td>
</tr>
<tr>
<td></td>
<td>40 (100%)</td>
<td>40 (100%)</td>
</tr>
</tbody>
</table>

**Table 1. Distribution of various condyle positions of TMJ in totally edentulous patients with symptoms and without symptoms of temporomandibular dysfunction. TMD – Temporomandibular dysfunction**

**Graph 1. Distribution of the condyle position in totally edentulous patients with TM dysfunction symptoms and patients without such symptoms**

**Graph 2. This graph shows the dominantly posterior position of the lower articular surface in the mandibular fossa in patients with TM dysfunction symptoms and the dominantly centric position of the lower articular surface in patients without such symptoms.**

**Figure 1. X-rays of the temporomandibular joint – anterior, centric and posterior condyle positions in the mandibular fossa.**
dysfunction have more posterior position of the condyle in the mandibular fossa 29/40 (72.5%) in comparison with the totally edentulous patients without such symptoms in whom the condyle position is more centric 24/40 (60%). There was a statistically highly significant difference in the condyle position in the mandibular fossa between the two examined groups (X² = 36.399; p < 0.001) (Graphs 1 and 2).

In X-rays of the temporomandibular joint we can clearly see the various condyle positions in the mandibular fossa (anterior, centric and posterior) (Figure 1).

5. DISCUSSION

The previous radiographic research findings indicate that in patients with the temporomandibular dysfunction symptoms and those being free of such symptoms, the anterior, the centric and posterior condyle positions were found in the mandibular fossa which is in accordance with the findings of this research. Pullinger and his associates analysed the condyle positions in the mandibular fossa by using tomography in patients with the symptoms of temporomandibular dysfunction. The research findings have shown the posterior condyle position in the mandibular fossa in 54% of cases, the centric condyle position in 29% and the anterior condyle position in 17% of cases (9). The findings of this research have shown 72.5% of the condyles have a posterior position in the mandibular fossa in patients with temporomandibular dysfunction symptoms, which is considerably higher in comparison with the research findings of Pullinger; in our research 7.5% of the condyles have the centric position while 20% of the condyles have the anterior position.

Bonilla-Aragon and associates (1999), by using both tomography and magnetic resonance, examined the relationship between the condyle position and the articular disc displacement in patients with temporomandibular dysfunction symptoms and those being free from such symptoms. In the group of patients without TM dysfunction symptoms it was found out that 36.5% of the subjects had the anterior condyle position in the mandibular fossa, 40.4% had the centric condyle position while 23.1% of the subjects had the posterior condyle position. In patients with symptoms of the disc displacement with reduction 23.1% of the subjects had the anterior condyle position in the mandibular fossa, 35.6% the centric condyle position while 41.3% of the subjects had the posterior condyle position.

In patients with symptoms of the disc displacement without reduction a higher percentage of the posterior condyle position was registered, namely in 48.4%, while in 31.3% of the subjects the centric condyle position was found in the mandibular fossa and in 20.3% of the subjects the anterior condyle position (3). The research findings of these authors show a high prevalence of the posterior condyle position in patients with temporomandibular dysfunction symptoms in comparison with patients without such symptoms, and this corresponds with our research findings.

Mongini indicates that in patients with symptoms of the temporomandibular joint dysfunction different condyle positions can be found by using radiographic analysis (10). By using tomographic analysis Vukovojac and associates have found that the centric condyle position in the mandibular fossa in the group of patients with TM dysfunction shows lower values in comparison with the control group. The above authors state that there is no significant difference in the anterior condyle position in the mandibular between the examined groups, while the difference in the posterior condyle position is obvious between the examined groups (11). The above research findings entirely correspond to the results of our research.

6. CONCLUSION

Totally edentulous patients with symptoms of temporomandibular dysfunction in the position of central occlusion have shown a more posterior condyle position in the mandibular fossa in comparison with totally edentulous patients without such symptoms in whom a higher number of the centric condyle position was found by using x-ray analysis.

REFERENCES


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