



## RESEARCH ARTICLE

### Clinical Findings of Temporomandibular Joint Disc Displacement with Reduction in Children and Adolescents

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#### ABSTRACT

**Objective:** Recent studies have shown that temporomandibular joint (TMJ) disc displacement with reduction (DDwR) frequently affects children and adolescents. Although it is noted that the incidence of TMJ disorders increases with age in young individuals, there is no study comparing symptoms across different age groups. This study aims to evaluate whether there is a difference in symptoms observed in the childhood and adolescent periods in terms of TMJ DDwR.

**Materials and Methods:** The study included 43 individuals with TMJ DDwR aged 9-16. Patients were divided into two groups, consisting of ages 9-12 (n:14) and 13-16 (n:29). The diagnosis of DDwR was made using a combination of clinical examination and, when necessary, imaging methods. Demographic data, diseased joints, sleep bruxism (SB), pain (Visual analog scale (VAS)), and maximum mouth opening (MMO) were assessed in clinical examination findings.

**Results:** Between the groups; the gender distribution is similar, and there is no statistical difference ( $p=0.058$ ). There is no difference in terms of the DDwR side ( $p=0.287$ ) and SB between the groups ( $p=0.058$ ). No relationship was found between age and pain scores ( $r=0.083$ ). When VAS and MMO values were compared between the groups, no statistically significant difference was found ( $p=0.127$  and  $p=0.062$ ).

**Conclusion:** TMJ DDwR symptoms appear to be similar in children and adolescents. Early diagnosis of symptoms in children and adolescents will help prevent the progression of the condition.

**Keywords:** Adolescents, children, prevalence, temporomandibular disorders.

#### INTRODUCTION

The term temporomandibular disorder (TMD) is used to describe pathological conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and associated structures. Common clinical signs of TMD are joint and/or muscle pain, joint noises, and limited or irregular jaw functions.<sup>1</sup> One of the most debated topics in clinical dentistry is the etiology of TMD, as these disorders are considered a heterogeneous group of psycho-physiological

disorders.<sup>2</sup> Although TMD has traditionally been considered a condition that primarily affects adults, epidemiological studies have reported its occurrence in children and adolescents.<sup>3</sup>

Among the several types of TMD, disc displacement with reduction (DDwR) is the most common type encountered in adults, with prevalence rates up to 35%.<sup>3</sup> It has also been reported in the young population, with prevalence rates around 26%.<sup>4</sup> For the differential diagnosis of DDwR, it is essential

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to accurately identify signs and symptoms. To ensure an early diagnosis, routine dental examinations in all age groups should always include the evaluation of TMJ and surrounding tissues.

Childhood spans the time from birth to approximately 11-12 years of age, while the period between 12 and 18 years of age is defined as adolescence. Adolescence encompasses a developmental period during which many biological, cognitive, social, and personality characteristics transition from childhood to adulthood.<sup>5</sup> TMD-related pain has previously been reported as the main non-dental cause of orofacial pain in children and adolescents. Pain is often localized in the masticatory muscles and preauricular region. In addition, TMJ sounds have been reported as a common TMD symptom in children.<sup>6</sup> In children, TMJ sounds may result from disc displacement, structural changes in the disc and joint surfaces, coordination disorders of muscles, or joint subluxation, similar to adults. Studies also indicate that TMD symptoms vary during childhood and adolescence, with pain symptoms becoming more pronounced, especially in later stages of life.<sup>7</sup> This study aims to evaluate whether there are differences in signs and symptoms among TMD patients in childhood and adolescence.

## MATERIALS AND METHODS

**Participants:** A retrospective study was made of a series of 75 TMD patients aged 9 to 16 years between the years 2020-2022. Fifteen patients were excluded due to an incomplete registry of the clinical data. Among the 60 patients, 43 patients with a diagnosis of TMJ DDwR were included in the study. The study was approved by the Ondokuz Mayıs University Faculty of Medicine Ethics Committee (OMÜ TAEK 2021/430) and conducted following the principles of the Helsinki Declaration. Diagnosis of TMJ DDwR was based on the criteria of the international DC/TMD consortium.<sup>8</sup>

-Inclusion Criteria:

- Patients aged 9-16 years with a diagnosis of TMJ DDwR at least on one side.

-Exclusion Criteria: Individuals with;

- a history of trauma to the TMJ region,
- a history of TMJ-related surgery,
- neurological or psychiatric disorders,
- dental or orofacial pain.

Two groups were then created according to the ages of the patients:

Group 1 (n=14): Patients aged 9-12 years diagnosed with TMJ DDwR.

Group 2 (n=29): Patients aged 13-16 years diagnosed with TMJ DDwR

**Clinical examination:** Demographic data, the presence of pain, and limitations in jaw functions were assessed for all individuals included in the study. Evaluated parameters included:

**Maximum Mouth Opening (MMO):** After ensuring that patients opened their mouths as wide as possible, measurements in millimeters were made with a ruler between the incisal edges of the central incisors in the upper and lower jaws.

**Joint Sounds:** The presence of joint sounds during palpation in the preauricular region and during mouth movements was noted.

**Pain intensity:** The Visual Analog Scale (VAS) was assessed to evaluate patients' complaints. The scale features a line ranging from 0 to 10, with a patient who has no pain rated at 0 degrees, and a patient with the most severe pain they have ever experienced rated at 10 degrees.

**Sleep bruxism (SB):** The diagnosis of SB depended upon the respondent's awareness, according to the Oral Behavior Checklist 8 and the dentoalveolar level.

**Statistical Analysis:** Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software package. Continuous variables were expressed as mean  $\pm$  standard deviation and categorical variables were presented as numbers and percentages. The normal distribution of variables was assessed using the Shapiro-Wilk test. The Spearman Correlation Test was used to assess the strength and direction of association between variables.

## RESULTS

This study included a total of 43 TMJ DDwR patients aged between 9 and 16 years. The demographic data of the patients is given in Table 1. All patients in both groups have a TMJ clicking sound. The mean age of the patients was calculated as 13, 65 $\pm$ 2, 14. The participants in the study consisted of 18 (41.9%) females and 25 (58.1%) males. In terms of gender, there was no statistically significant difference among the



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groups ( $p= 0.058$ ) TMD was unilateral in 76% of cases and bilateral in 24% of cases. There is no difference in terms of the TMD side between the groups ( $p= 0.287$ ). When the presence of bruxism was assessed, it was observed to be present in 64% of patients in the first group and 65% in the second group. The difference between the groups was not found to be

statistically significant ( $p= 0.598$ ). When VAS and MMO values were compared between the groups, no statistically significant difference was found ( $p=0.127$  and  $p=0.062$ , respectively) (Table 2). No statistical relationship was found between age and VAS score ( $r= 0.083$ ).

**Table 1.** Statistical comparison of groups in terms of SB, TMD side, and gender.

	n	SB	TMD side		Gender	
			Unilateral	Bilateral	Girl	Boy
Group 1	14 (%32,6)	9 (%64)	12	2	3	11
Group 2	29 (%67,4)	19 (%65)	21	8	15	14
Total	43	28 (%65)	33	10	18	25
p		0,598	0,287		0,058	

Abbreviations: SB: Sleep bruxism; TMD: Temporomandibular disorder.

**Table 2.** Assessment of groups Based on MMO and VAS findings

	VAS Mean±SS	MMO Mean±SS
Group 1	5,14±2,21	33,64±5,73
Group 2	6,03±3,02	36,72±5,20
p	0,127	0,062

Abbreviations: VAS: Visual Analog Scale, MMO: Maximum mouth opening

## DISCUSSION

In the past, TMD has been widely believed to be more common in adults. Nevertheless, an increasing number of clinicians have affirmed that TMD exhibits a high prevalence among adolescents.<sup>9</sup> Recent studies reported that the prevalence rate of DDwR was around 26% in the young population.<sup>10</sup> Despite the similarities in the masticatory systems of adults and children, some notable differences exist. The most significant distinction lies in the growth and development process in children, and another significant difference is a child's capacity to tolerate changes in their masticatory system. Unlike adults, who can readily perceive even minor alterations in occlusion, such as elevated restorations, and may experience discomfort, children may struggle to discern sudden occlusal changes and can easily adapt to resultant pathological conditions. Over time, this adaptation can transform into permanent pathological changes in adulthood.<sup>11</sup>

Children with TMJ DDwR may experience a range of symptoms, including jaw pain, clicking or popping sounds during jaw movement, limited mouth opening, and discomfort while chewing. The prevalence of the signs and symptoms typically increases with age.<sup>12</sup> In a study conducted by Marpaung et al., TMD prevalence was compared between children and adolescent age groups, revealing a higher prevalence among adolescents (13-18 years; 36.9%) compared to children (7-12 years; 23.4%).<sup>13</sup> Furthermore, Bonjardim and colleagues' study<sup>14</sup> suggested that adolescent girls are probably more affected than boys, likely due to biological variables, as girls typically undergo early maturation compared to boys. This situation can be attributed to the characterization of most symptoms as mild in young children, the higher adaptability of children compared to adults, and therefore the challenges in detecting TMD in children. This often results in research predominantly focusing on patient samples actively seeking



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treatment.<sup>15</sup> In our study, unlike the literature, no relationship was detected between age and clinical symptoms. The reason for this difference may be the examination of a more specific TMD subgroup in our study. The term TMD is used to describe a range of conditions involving the TMJ and its related structures. Clinically and radiologically, numerous diseases that are distinct from one another are categorized under the TMD umbrella. This situation can lead to confusion in the literature. It was argued that defining study populations solely based on the presence of TMD made it impossible to identify specific treated conditions. Clarifying a specific TMD subgroup allows for more realistic results. In our study, patients diagnosed with TMJ DDwR were evaluated for this purpose.

Studies have shown that children with TMD rarely present with complaints of pain to healthcare professionals. In a study conducted by Al-Khotani and colleagues, it was determined that over 75% of children with TMD had not sought any medical or dental care for their pain.<sup>16</sup> Nonetheless, pain in children and adolescents can have serious consequences because orofacial pain can impact their quality of life, particularly their physical and learning abilities. Additionally, it can affect their sleep patterns, influencing growth and development.<sup>17</sup> Therefore, early diagnosis is crucial as it can prevent disease progression and irreversible damage to structures. Especially in children, there is a higher potential for muscle recovery, and their physiological adaptability can help reduce TMD symptoms.<sup>18</sup>

Temporomandibular joint sounds are categorized as cardinal symptoms of TMD. According to a systematic review, 14.0% of the children or adolescents had clinical TMJ sounds, while a current investigation detected an even higher percentage up to 31.9% for German adolescents.<sup>19</sup> Farsi et al. reported joint sounds as the most common TMD symptom in children.<sup>6</sup> In our study, all patients had TMJ sounds. This is attributed to the fact that the patient population consisted of individuals with TMJ DDwR. Joint sounds are quite common in childhood and often resolve on their own without the need for treatment. However, it should be noted that these patients may be more susceptible to TMD disorders in later life.<sup>20</sup>

There is a debated association between SB and TMD. Some studies suggest that individuals with SB may have a higher risk of developing TMD, while others do not find a significant link. In our study, SB was found in %65 of the patients. No difference was found in terms of SB presence between the child and adolescent groups. In our study, SB was assessed

using both OBCL (Oral Behaviors Checklist) and dentoalveolar examination. Polysomnography (PSG) is the gold standard for SB assessment, but it can only be performed in specific centers and is challenging to implement. In children and adolescents whose growth and development are still ongoing, the accurate assessment of factors causing TMD is crucial for jaw function and facial development. Early diagnosis and treatment of TMD can prevent future problems for the individual. Maintaining healthy lifestyle habits is important for pain management, but psychological interventions that help adolescents develop pain-coping skills, such as relaxation training and cognitive restructuring, can make a significant difference.<sup>21</sup> Furthermore, studies have shown that parafunctional habits observed in child patients can act as predictors of the same habits 20 years later.<sup>22</sup>

The main limitation of this study is the young age group under evaluation, which tends to conceal their existing symptoms and has low cooperation. The other limitation is that it is an associational type of research and not a cause-effect investigation. Based on this fact, it is not possible to establish a causal link among the variables. In addition, no control group was used for comparison with the study group. However, this is the first study in the literature that solely evaluated children and adolescents with TMJ DDwR.

There is no approved TMD management specifically for children and adolescents, but non-invasive and reversible care should be preferred. Therefore, examining the chewing system should be included as part of routine dental check-ups to prevent TMD. A clinical examination (muscle and joint) is necessary to identify the most common symptoms, including facial pain and/or joint sounds palpated. If there are TMD symptoms, behavioral retraining should begin as soon as possible, and the patient should be reevaluated.

In conclusion, TMJ DDwR in childhood is a multifaceted condition that requires careful evaluation, accurate diagnosis, and appropriate management. Early intervention and a comprehensive approach that considers both physical and emotional aspects can help children lead healthier, pain-free lives while minimizing potential long-term consequences. Regular follow-up and collaboration between healthcare providers are essential to achieving the best outcomes for affected children.



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## Conflict of Interest

The authors and/or their family members have no potential conflicts of interest related to this study, including scientific and medical committee memberships or affiliations, consultancy, expert witness involvement, employment in any company, shareholding, or similar situations.

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