

# Use of the universal pain assessment tool for evaluating pain associated with temporomandibular disorders in youngsters



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## Abstract

**Aim** Determine, whether the UPAT could be used as an extra tool to collect data on functional TMJ pain and to assess orofacial pain levels related to temporomandibular disorder(s) (TMD) in youngsters.

**Methods** Patients were screened at the N1 Dental Clinic of Tbilisi State Medical University. The clinical scores of possible functional jaw pain were collected using the UPAT, to indicate pain severity on a visual scale during different jaw movements (opening, closing and lateral). Statistics: Comparisons of categorised data have been performed by chi-square test and Fisher's Exact test (where expected values were less than 5). The P value less than 0.05 was considered as statistically significant.

**Results** Two hundred and ninety-one youngsters were screened by calibrated dentists. The majority (59%) of participants were male; age distribution ranged from 8 to 15 years (mean  $11.46 \pm 2.11$ ). The results of the UPAT demonstrated the existence of functional TMJ pain in 15.46% (n=45) of the patients without significant prevalence ( $P > 0.05$ ) in this survey group.

**Conclusion** According to the results of the present study, the UPAT demonstrated that it could be an additional tool to detect the existence of functional jaw pain possibly associated with TMD and also a valid instrument to score pain intensity associated with TMD in youngster patients.

## Introduction

The metric termed, "Years lived with disability" (YLDs), which measures a disease's morbidity is how the World Health Organization (WHO) quantifies the effect of personal and socioeconomic impact experienced in terms of associated persistent pain and disability [Basi et al., 2012].

In 2002, the most recent year for which data are globally available, more YLDs were lost to musculoskeletal diseases than to cardiovascular diseases, respiratory diseases or malignant neoplasms [Manfredini et al., 2012]. Temporomandibular disorders (TMD) are the second most common occurring musculoskeletal conditions resulting in pain and disability, subsequent to chronic low back pain. TMD affects 5 to 12% of the population, with an annual cost estimated at 4 billion \$. One half to two-thirds of people with TMD disorders will seek treatment. Among this group, approximately 15% will develop chronic TMD [Basi et al., 2012].

According to the results of the study by Dugashvili et al. [2017] the Universal Pain Assessment Tool (UPAT) [Dugashvili et al., 2017; Gupta et al., 2012] demonstrated that it might be an additional tool to detect the existence of functional jaw pain possibly associated with TMD and also an additional instrument to score pain intensity associated with TMD in people with internal derangement (ID). In the present study, the above-mentioned tool was used in order to identify if TMD can originate in ASA 1 youngsters.

The feedback could enable clinicians in the early recognition of pain-related behaviour to avoid undertreatment of TMD related problems in youngster patients.

The purpose of this study was to: 1) determine, whether the UPAT could be used as an additional tool to collect data on functional TMJ pain and to assess orofacial pain levels related to TMD in youngsters, and 2) identify if the TMD issue can originate from an early age.

## Materials and methods

Youngster patients were screened at the N1 Dental Clinic of Tbilisi State Medical University in Tbilisi, Georgia. The

**KEYWORDS** Universal pain assessment tool, TMD in youngsters, Georgia.

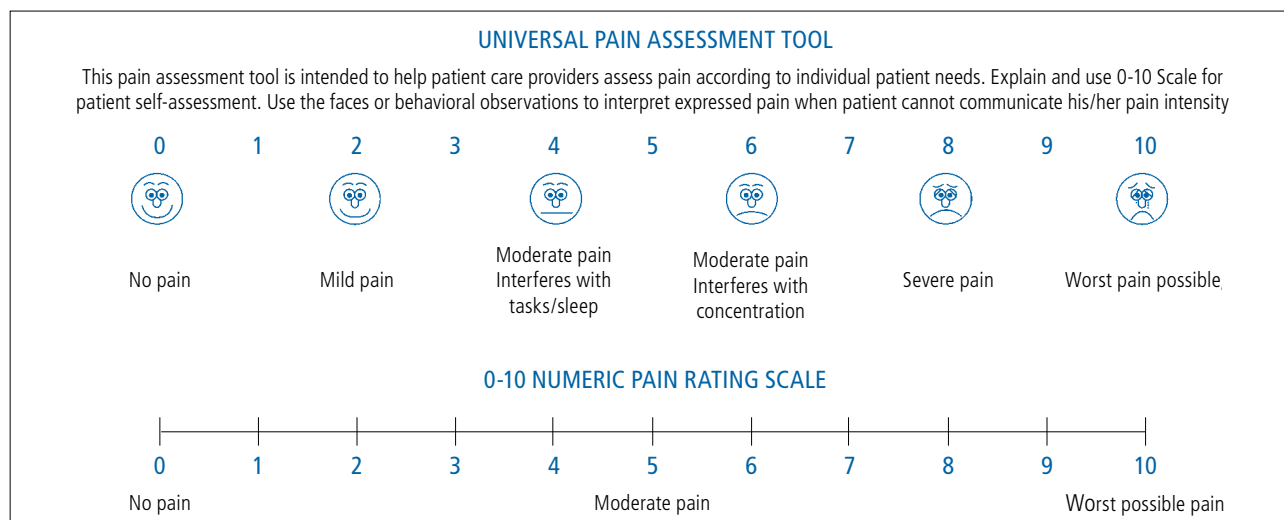


FIG. 1 The Universal Pain Assessment Tool (UPAT), that has been used to identify functional TMJ pain.

youngsters, who addressed the dental clinic because of dental issues, were undergoing different dental treatments.

Prior to the treatment, patients were invited for the screening of TMD on a voluntary basis. Written consent was obtained from the patient and a parent or guardian. In full accordance of the World Medical Association Declaration of Helsinki, the Joint Ethical Committee of Khechinashvili University Hospital approved the study as 2016/13.

Identification of functional jaw pain was measured using the UPAT [Ohrbach et al., 2011] (Fig. 1). Five jaw movements were assessed [Schiffman et al., 2014]: opening, maximum unassisted opening, maximum assisted opening (when moderate digital pressure was used to increase the degree of opening, if possible), left lateral excursion and right lateral excursion. The TMJ was palpated at 3 locations: lateral pole, posterior attachment (via the external acoustic meatus), and dorsal aspect (with 25-30 mm of jaw opening) [Ohrbach et al., 2011].

Additionally, the superficial masticatory muscles (masseter and temporalis) were palpated. By means of mechanical stimuli caused by digital pressure, nociceptive neurons located in the muscular and myofascial structures were stimulated to detect and transmit pain messages to the central nerve system [Conti et al., 2007].

The palpation was done as follows: the masseter at its attachments to the zygomatic arch and angle of the mandible, the temporalis both in the temporal fossa and intraorally along the ascending ramus of the mandible, and the medial pterygoid bimanually, placing one finger externally at the medial aspect of the angle of the mandible and the other finger orally in the lingual vestibule in the retromolar region [Meyer, 1990].

For right and left excursive movements, patients were directed to open slightly and move their jaws as far as possible towards the right and left, even if it was painful, and then move their jaw back to a comfortable position and position their posterior teeth completely together each time. If the subject was confused about which direction they should move their jaw, they would be told to move their jaw towards the hand touched on the side of the desired movement. For all excursive movements, the subject was asked to repeat the movement three times. If pain was reported during any of those movements, patients were asked to indicate the severity

of their pain on the UPAT. At no time during the screening, was a suggestion made nor was the subject led to respond about the presence of pain.

Joint noises (click, crepitus) were detected during the screening while placing fingers over the TMJ on either the right or the left side during opening and closing movements. Both trained examiners were calibrated for the UPAT exams included in the tests. Inter- and intra-examiner scores were higher than 80%.

#### Data analysis

All of the data were recorded using the UPAT and processed by SPSS software (IBM® SPSS® Statistics 22 Version 22.0.0.1). The level of significance was set at 0.05. Comparisons of categorised data have been performed by chi-square test and Fisher's Exact test (where expected values were less than 5). A P value less than 0.05 was considered as statistically significant.

#### Results

Two hundred and ninety-one patients were evaluated. The majority (59%) of participants were male (172 male and 119 female patients); age distribution ranged from 8 to 15 years (mean  $11.46 \pm 2.11$ ) (Fig. 2). The results of the UPAT demonstrated the existence of functional TMJ pain in 15.46% (n=45) of the youngster patients without significant prevalence ( $P > 0.05$ ) in the survey group.

Seventy eight percent of pain associated with TMD was reported as mild. As the severity of pain level increased, the distribution of pain decreased, this can be markedly seen on figure 3. Considering different jaw movements, the subjects reported far more pain on maximum opening without significant difference between assisted or unassisted opening ( $P > 0.05$ ) (Fig. 4). Joint sounds were found in 25.43% of subjects, 49% of these subjects also reported functional pain (Fig. 5). The radiographic images of the eight ear old patient with explicit joint sounds can be seen on figure 6.

#### Discussion and conclusion

There are several studies in the literature regarding TMD in

youngsters reporting that the TMD issue can originate from an early age with similar signs and symptoms to those seen in adults [Casanova-Rosado et al., 2006; Gazitetal., 1984; Grosfeld and Czarnecka, 1977; Magnusson et al., 1985]. Early assessment and appropriate intervention for pain associated with TMD seems important in order to eliminate the problem at an early stage, as later the symptoms can become chronic and more difficult to manage. Additionally studies by Minghelli et al. and Al-Khotani et al. revealed a significant association between TMD and the levels of emotional stress. [Al-Khotani et al., 2016; Minghelli et al., 2014].

The present study has been conducted, in order to collect data on functional TMJ pain and to assess pain levels in youngster patients, using the UPAT. Moreover, the present method for evaluating pain, would give an extra opportunity to an earlier intervention in case of suspected pain.

Certain aspects can be considered to be the limitations of the present study. There is an unequal female/male ratio. This ratio is considered to be an important factor, because studies have demonstrated, that starting from adolescence, prevalence of temporomandibular symptoms is higher in females than in males [Barbosa et al., 2008; Bonjardim et al., 2005]. Secondly, as far as only a particular group of patients has been studied, the result of the present research cannot be generalised. The outcomes have shown that the issue is problematic and needs further study.

According to Kim et al. [2012], TMD can occur at any age. They investigated various age groups and demonstrated that patients younger than 40 years of age have shown high incidence (74%), of which 38% is the youngest group (under

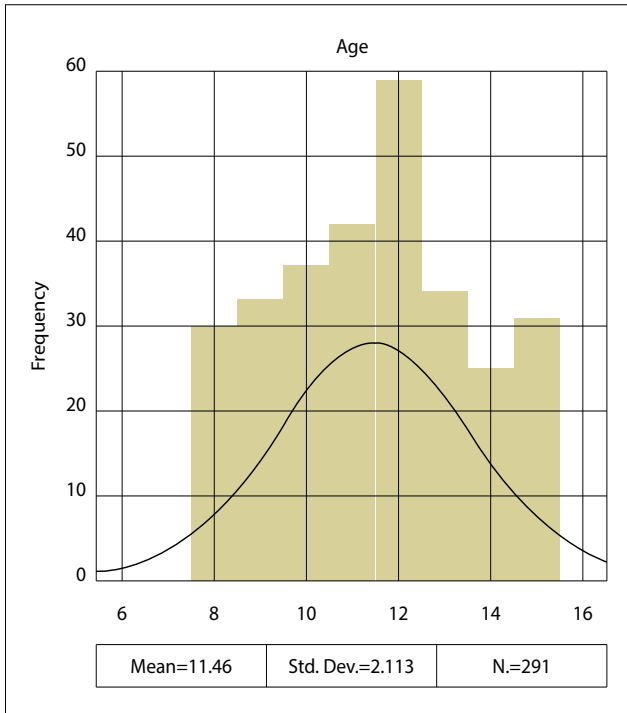


FIG. 2 Age distribution of screened patients.

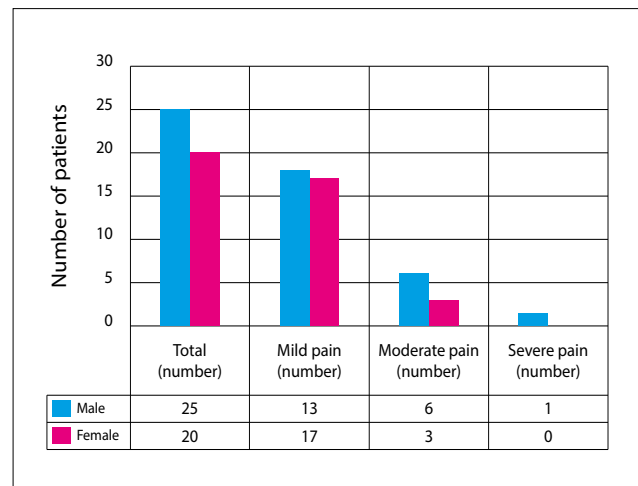


FIG. 3 Distribution of pain levels among male and female patients.

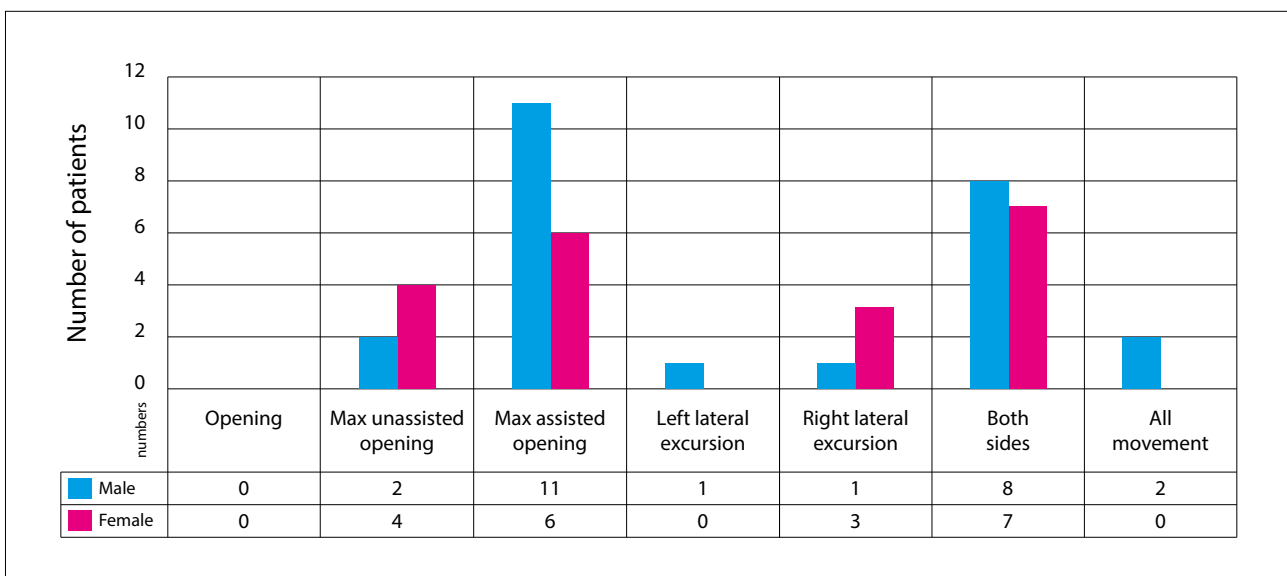


FIG. 4. Distribution of functional jaw pain according to the different jaw movements.

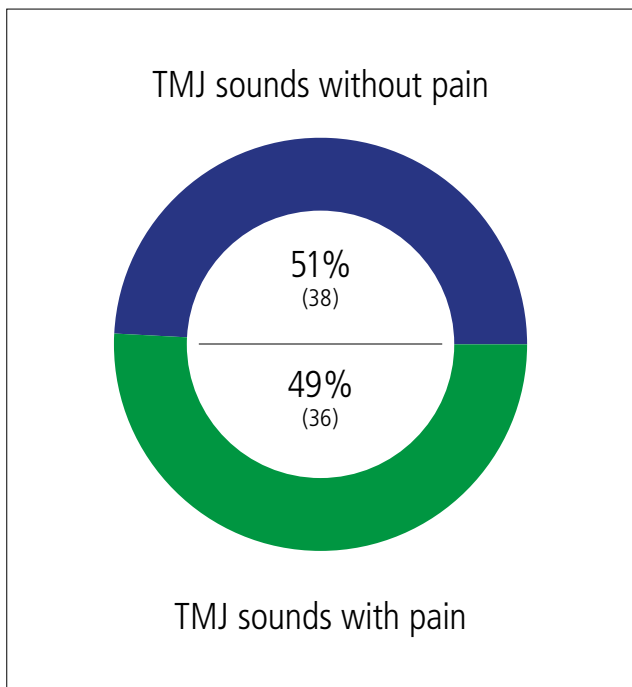


FIG. 5. Distribution of TMJ sounds with and without functional pain report.

25 years). The study also suggested the tendency in younger patients needs to be continuously screened.

Unlike the above-mentioned study, the present research has shown a non-significant prevalence ( $P > 0.05$ ) of pain associated with TMD in youngsters, within the ages of 8 to 15 years.

According to the same study [Kim et al., 2012], there is a tendency of female patients to be predisposed to TMD more than male patients. A possible explanation of this has been associated with the female sex hormone estrogen [Cairns,



FIG. 6A

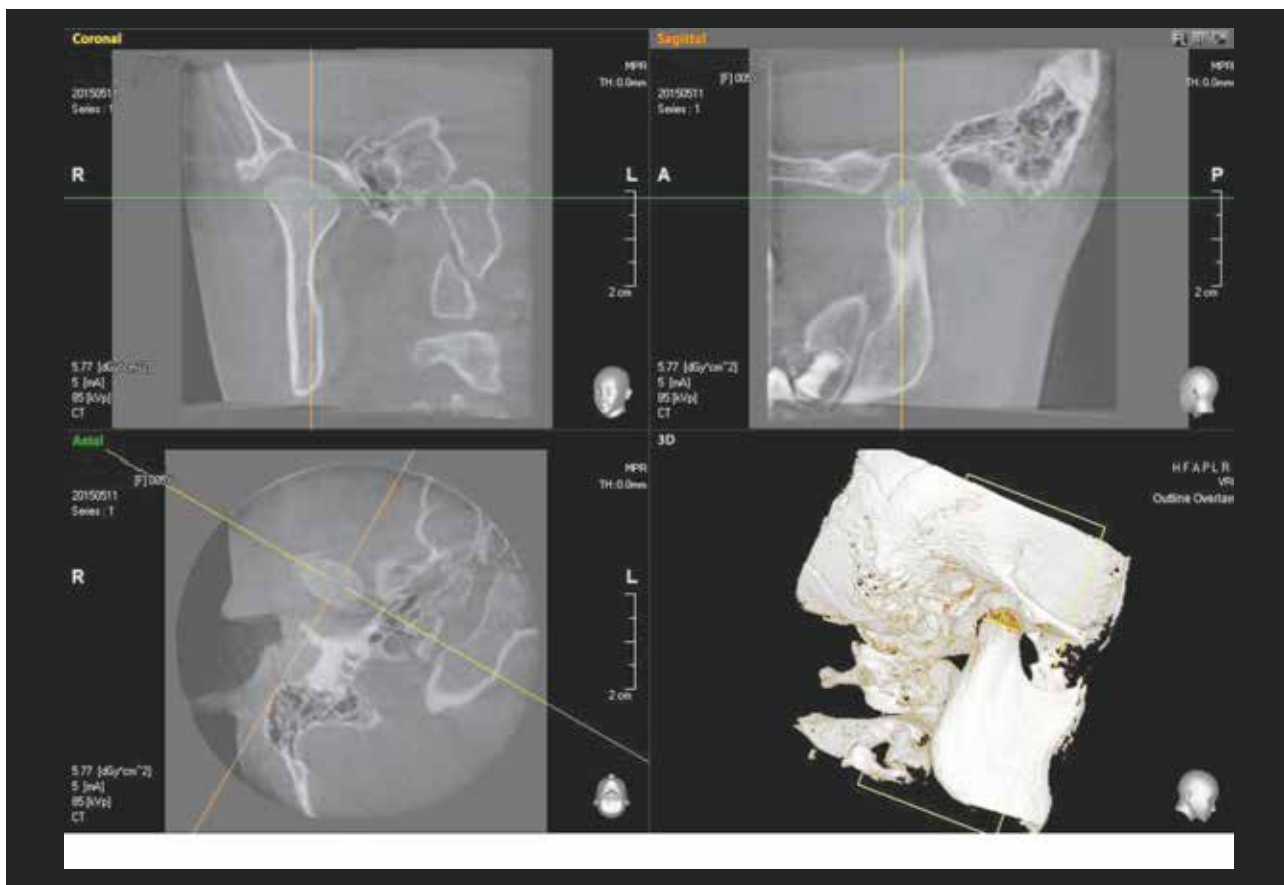


FIG. 6B

FIG. 6. The radiographic images of the eight year old patient with explicit joint sounds.

2010]. In animal models estrogen has been shown to modulate inflammation in the TMJ [Guan et al., 2005; Flake et al., 2006]. Moreover, Flake et al. [2006] suggest that testosterone and estrogen have opposing actions on TMJ. This could also account for the higher prevalence and severity of pain associated with TMD in females by suggesting that testosterone may mitigate, while estrogen exacerbates TMJ damage, particularly in the presence of overt inflammation. As the subjects in this group were youngsters the impact of the hormones is unclear.

Another limitation of the current study is that the palpation was done with limited objective measurement of the force applied. Calibration of the practitioners with an adequate inter- and intra-examiner score tried to standardise these screenings.

Signs such as pain on palpation, joint noises are clinical signs that are frequently found in the examination of normal population without leading to a diagnosis of TMD. Consistent implementation of the DC/TMD in future studies will enable a more reliable definition of TMD cases for comparison of their findings.

The present study has outlined, that when pain associated with TMJ noises is present, TMD can be present. Similar findings can be found in the study of Ohrbach et al. [2011]. However, noises alone are no longer considered to be diagnostic for TMD, since they can be detected in a high proportion in general populations [Wright and North, 2009].

According to Glaros et al. [2005], the existence of stress and emotional distress, together with oral parafunctional behaviours can be predictive for TMD. They suggest that treatment focusing on coping with psycho-emotional problems could be effective by diminishing excessive masticatory muscle tension. Myogenous TMD is frequently considered to be the most common type of TMD and is generally caused by increased muscle activity triggered by emotional stress [Lauriti et al., 2013]. As far as the TMJ screening was performed at the dental clinic, before the patients would undergo different dental treatments, the stress factor should be taken into consideration while interpreting the results. According to Chisnoiu et al. [2015], stress and anxiety issues can influence on the person's psyche and may lead to pain, due to spasms of the internal, external pterygoid and masseter muscles caused by bruxism (grinding, clenching, bracing).

In conformity with the above-mentioned, TMD in dental patients could be considered as stress related. However, the issue needs to be further researched and cannot be generalised.

Although TMD is not considered to be life-threatening, it can be deleterious to the quality of life [Shietal., 2003], as symptoms could become chronic and difficult to manage if they are not detected and eliminated at an early stage.

According to the results found in this study, the UPAT demonstrated to be an additional and useful tool to detect the existence of functional jaw pain possibly associated with TMD in youngsters and it could be suggested to be included in the standard 6 months dental check-up.

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