**BACKGROUND**

- The temporomandibular joint (TMJ) is one of the most commonly affected joints in juvenile idiopathic arthritis (JIA).¹
- TMJ sounds (e.g. crepitus) are a common but poorly understood sign.
- Early detection of TMJ involvement in JIA is difficult due to inconsistent symptoms and low sensitivity of conventional imaging (i.e. panorex), and variable physical exam.
- Magnetic resonance imaging (MRI) is necessary for a formal diagnosis, but MRI is time consuming, expensive, require contrast administration, and sometimes sedation.
- Acoustic emissions (AEs) produced during joint articulation have previously been shown to correlate well with affected knees in children with JIA.²,³
- These sounds may be able to serve as a non-invasive measurement and/or physiologic biomarker of TMJ involvement in children with JIA.

**OBJECTIVE**

- To determine TMJ involvement in children with JIA using the TMJ AE’s profile.

**METHODS**

- Subjects: 15 children with JIA (7 with TMJ sounds, 8 without TMJ sounds)
- Custom headgear with embedded uniaxial accelerometers positioned above the TMJ.
- Subjects performed 10 cycles of 2 standardized movements (open/close, medial/lateral) at a rate of 1 cycle per 4 seconds while watching a demonstration video. The video allows children of all ages to easily reproduce the exercises at a constant speed.
- While performing the exercises, the sounds are recorded using a custom MATLAB script that records both microphones simultaneously.

![Image](image1.png)

**RESULTS**

- Qualitatively, the time-domain AE signal appears more chaotic in patients with TMJ sounds.
- TMJs of patients with JIA without TMJ involvement produced a comparatively smoother signal.
- The b-Value metric showed significant differences between the two groups for both medial-lateral and open-close exercises (p=0.0059; 0.0009, respectively).

**CONCLUSIONS**

- In this group of patients, AEs were different in children with JIA and TMJ sounds and without TMJ sounds.
- With further recruitment of subjects and refinement of this technique, assessment of TMJ sounds may one day serve as a viable screening tool for TMJ involvement in JIA.

**REFERENCES**


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