A meta-analysis of EMG biofeedback treatment of temporomandibular disorders

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Authors' objectives
To review the available literature to determine the efficacy of electromyographic biofeedback-based treatments for temporomandibular disorders.

Searching
MEDLINE (1966 to 1995) and PsycLIT (1990 to 1997) were searched using the search terms "temporomandibular" and "TMD" with "biofeedback". Bibliographies in the Mealiea and McGlynn review and 2 recent commentaries (see Other Publications of Related Interest) and reprints in the authors files were searched.

Study selection
Study designs of evaluations included in the review
Controlled trials in which EMG biofeedback treatment was compared with no treatment or a psychological placebo, comparative trials in which EMG biofeedback treatment was contrasted with an alternative therapy and uncontrolled trials of EMG biofeedback treatment.

Specific interventions included in the review
Electromyographic (EMG) biofeedback training either alone or in combination with stress management techniques. EMG biofeedback was directed at either the masseter or frontalis site.

Participants included in the review
Patients with temporomandibular disorders. The proportion of female patients in each trial ranged from 45-100% with a mean of 85%. The mean patient age ranged from 23 to 44.7 years with an overall mean of 35 years.

Outcomes assessed in the review
Clinical assessment of global symptom improvement, reported pain (self-reported by patient) and clinical examination of the TMJ and masticatory muscles.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The authors do not state that they assessed validity.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
Pre- to post-treatment effect sizes were calculated for studies that presented suitable data. The pre-to post-treatment effect sizes were calculated separately for the treatment (bio-feedback) arms of the trials and for the control groups for the controlled trials (either no treatment or placebo).

How were differences between studies investigated?
The authors do not state how differences between the studies were investigated.

**Results of the review**
Thirteen studies were included: 6 controlled trials, 4 comparative trials and 3 uncontrolled trials.

5/6 controlled trials reported statistically significant differences between EMG biofeedback treatment and control conditions on at least one type of outcome. 4/5 found EMG biofeedback significantly superior to no treatment or psychologic placebo, 2/4 found it superior for clinical exam outcomes and 2/2 found it superior for general improvement. The mean proportion of EMG patients that met the improvement criteria (68.6 %) was approximately twice that of placebo control patients (34.7%). The difference in the mean effect size for EMG biofeedback treatment (1.04) and the mean effect size for control conditions (0.47) approached significance (p<0.10). For clinical examination the mean effects size for EMG biofeedback (1.33) treatment is significantly different (p<0.01) from the mean effect size for control conditions (0.26).

**Authors' conclusions**
Although limited in extent, the available data support the efficacy of EMG biofeedback treatments for TMD.

**CRD commentary**
The literature search was adequate although it would have benefited from searching further databases and attempting to include unpublished studies. The authors do not state whether there were any restrictions on the language in which the study was published or whether the bibliographies of identified studies were searched for further references. No information was provided on how studies were selected, how and what data was extracted and there was no attempt to assess the validity of the included studies. In the meta-analysis, the two sections of the controlled studies were treated separately, thereby losing the controlled element of the trial, and the average improvement was calculated separately for all studies that included a treatment arm (including those with no control group) and for the placebo or no treatment arms. The authors report that this was due to limitations of the data, however such analysis can give misleading results and should therefore be interpreted with caution. The authors state that the results presented were weighted, but it is unclear how this was done. Heterogeneity was not investigated. Based on these limitations the authors conclusions should be viewed with caution.

**Implications of the review for practice and research**
The author states that there is a need for large-sample, controlled trials designed to estimate better the specific effects of EMG biofeedback treatment.

**Bibliographic details**

**PubMedID**
10425966

**Other publications of related interest**
Indexing Status
Subject indexing assigned by NLM

MeSH
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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.