The efficacy of nonopioid analgesics for postoperative dental pain: a meta-analysis

Authors' objectives
To examine the efficacy of non-opioid analgesics in post-operative dental pain.

Searching
The authors conducted a literature search for English-language articles using MEDLINE and Health electronic databases (1975 to August 1996) using the three search terms: 'pain', 'analgesics', and 'dentistry'.

Study selection
Study designs of evaluations included in the review
Placebo-controlled, randomised, double-blind trials with a parallel study design were eligible for inclusion. Only studies that used the third-molar extraction pain model, categorical pain scales similar to that described by Cooper and Beaver (see Other Publications of Related Interest no.1), and had a minimum follow-up period of at least 6 hours post-operatively, were included. Studies that used slow- or controlled-release administration of drugs administered steroids, or did not report moderate or severe baseline pain, were excluded.

Specific interventions included in the review
Various doses and combinations of non-opioids such as acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs), the commonly prescribed acetaminophen-codeine combinations (acetaminophen 60, 65 or 100 mg with codeine 60 mg), and placebo.

The regimes and doses of NSAIDs included those recommended for dental treatment: diflunisal (500 and 1,000 mg), flurbiprofen (100 mg), ibuprofen (400 mg), ketorolac (10 and 20 mg), and naproxen (440 and 550 mg).

Participants included in the review
Dental patients undergoing third-molar extractions. The age of the participants was not stated.

Outcomes assessed in the review
Pain relief, measured by one of the following efficacy measures: summed pain intensity difference (SPID), peak pain intensity difference (PPID), total pain relief (TOTPAR), or peak pain relief (PPAR).

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 specifically assessed quality.

Data extraction
The authors do not report who, or how many of the authors, extracted the data.

The authors converted all the data to a common percentage scale using formulae described by Eisenberg et al. (see Other Publications of Related Interest no.2).

Methods of synthesis
How were the studies combined?
The N-weighted mean effect was used as the outcome measure when the studies were combined. The random-effects model of DerSimonian and Laird (see Other Publications of Related Interest no.3) was used to determine the differences in efficacy. The outcome measure of each meta-analysis, the percentage relative difference, was calculated along with 95% confidence intervals.

How were differences between studies investigated?
No specific tests for homogeneity were conducted.

Results of the review
Thirty-three randomised controlled trials, with 6,920 participants, were included in the review. After excluding dropouts and those patients who were taking drugs not considered to be the focus of the review, 5,171 patients remained in the analysis.

Better pain relief was obtained from non-opioids (acetaminophen and NSAIDs), compared with a placebo, on all four pain scales: the rates of analgesia were -1 to 30% for placebo versus 16 to 63% for non-opioids; these were statistically significant.

Acetaminophen-codeine-60 was statistically significantly more efficacious than either placebo or acetaminophen only.

There was no statistical significance between all NSAIDs as a group and acetaminophen-codeine-60. Therapeutic doses of those NSAIDs commonly recommended for dentistry gave statistically significantly superior pain relief, compared with acetaminophen-codeine-60, on the PPAR and TOTPAR scales. On the PPID and SPID scales, there was a trend favouring the NSAIDs that did not reach statistical significance.

Authors’ conclusions
The meta-analysis showed that, in the dental pain model, the NSAIDs recommended in dentistry may be more efficacious than acetaminophen-codeine-60 when they are prescribed at appropriate doses. In particular, specific doses of the NSAIDs diflunisal, flurbiprofen, ibuprofen, and ketorolac are more effective for relieving pain than the commonly prescribed acetaminophen-codeine-60.

CRD commentary
The authors stated the review question clearly and conducted a reasonable review of the literature. The criteria for inclusion were reported in great detail and the included studies were listed in tabular format.

The authors limited their literature search to English language studies in only two databases and did not report whether they searched for unpublished data. It is unclear whether additional relevant studies may have been missed.

The authors did not state who selected the articles and extracted the data. In addition, it was not stated whether the selected articles were specifically reviewed for quality, although the selected studies were limited to randomised controlled trials with stated outcome measures and minimum follow-up periods. A random-effects model was used, but there was no test for homogeneity; this is important where there were many different treatment regimes and participant study characteristics in the meta-analysis.

The authors’ conclusions have been reported selectively from the results. In the few cases where statistically-significant results were reported, these should be viewed with caution because the quality of the included studies was not assessed and there may have been bias in the study selection, review, data extraction and meta-analysis.

Implications of the review for practice and research
The authors state that their results support the validity of the recommendations advocating the use of NSAIDs in practice. They also recommend that future studies should report standard deviations to aid meta-analysis, and that results should be reported according to age and gender groups so that differences between these groups can be investigated.
Bibliographic details

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Other publications of related interest

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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.