Treating fever in children: paracetamol or ibuprofen?

Purssell E

Authors' objectives
To compare the effectiveness of paracetamol and ibuprofen as antipyretic medications for children.

Searching
MEDLINE, EMBASE, CINAHL and the Royal College of Nursing database were searched from 1970. The keywords used were ('children' or 'infants' or 'paediatric' or 'pediatric') and ('fever' or 'febrile' or 'pyrexia' or 'temperature') and ('paracetamol' or 'acetaminophen') and 'ibuprofen'. Textbooks and reference lists were also searched.

Study selection
Study designs of evaluations included in the review
Studies that reported sufficient statistics to allow the calculation of effect size were eligible. The included studies were randomised controlled trials (RCTs), including double-blind RCTs, and controlled trials in which it was unclear whether they were randomised or not.

Specific interventions included in the review
Comparisons of oral paracetamol and ibuprofen were eligible for inclusion. In the included studies, the paracetamol doses ranged from 8 to 15 mg/kg and the ibuprofen doses ranged from 0.5 mg/kg (tabulated figure; minimum dose of 5 mg/kg reported in the text) to 10 mg/kg.

Participants included in the review
Children with fever were eligible for inclusion. All of the included children had a high temperature because of one of a variety of conditions. These included infections of the urinary tract, upper and lower respiratory tract and unclassified viral infections. Most of the children were otherwise well, but one study included children who had had a febrile convulsion. The age of the children ranged from 4 months to 13 years. Most of the studies were conducted in accident and emergency departments, children on in-patient wards, or groups of both. One study used paid volunteers.

Outcomes assessed in the review
Studies that assessed temperature at either zero, 1, 2, 4 or 6 hours, or at all of these time-points, were eligible. Side-effects were also assessed. The included studies recorded temperature in different ways, such as rectal and axillary thermometers.

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

Assessment of study quality
Validity was assessed by considering the description of randomisation and the extent of blinding. The sole author assessed information on the validity criteria.

Data extraction
The sole author extracted the data. The tables presented in the review included the following information: author and date of publication, sample size, randomisation, blinding, timing of follow-up, and details of treatment dosages. The effect sizes were calculated from mean temperature and standard deviations where these data were presented; if not, other statistics were used where possible.
Methods of synthesis

How were the studies combined?
The pooled differences in temperature between the treatments were calculated at 1, 4 and 6 hours, along with the 95% confidence intervals (CIs).

How were differences between studies investigated?
Statistical heterogeneity was calculated using META Meta-Analysis Programme 5.3 (reference provided).

Results of the review

Five RCTs (448 children) and 3 other controlled trials in which it was unclear whether randomisation had been used (251 children) were included in the review (total of 699 children).

At 1 hour (5 studies, 448 children), the mean difference in temperature between ibuprofen and paracetamol was -0.01 degrees C (95% CI: -0.04, +0.02, p=0.22). The results from individual studies differed, but statistical heterogeneity was not significant.

At 4 and 6 hours, all of the studies reported similar results. No significant heterogeneity was detected. The mean difference in temperature between ibuprofen and paracetamol was +0.63 degrees C (95% CI: +0.59, +0.67, p=0.00003) at 4 hours (6 studies, 423 children), and +0.58 degrees C (95% CI: +0.52, +0.64, p=0.005) at 6 hour (5 studies, 267 children).

Side-effects: the quality of the reporting of side-effects varied. No great differences were seen in the tolerability of treatments.

Authors’ conclusions
Both paracetamol and ibuprofen are effective antipyretics and both are well tolerated. There is no evidence of a difference in the short-term adverse effects. The longer action of ibuprofen may make it preferable under some circumstances.

CRD commentary
The aims of the review were stated and the inclusion criteria were defined in terms of the participants, intervention and outcome. Several sources of relevant studies were searched, but it was unclear whether any language restrictions had been applied and the methods used to select the studies were not described. Validity was assessed and relevant data were extracted and tabulated. The sole author extracted the data, and as the author acknowledged, this raises the potential for bias or errors. The characteristics of the included studies were adequately summarised in the text of the review. Statistical heterogeneity was assessed and the studies were appropriately combined in a meta-analysis. However, the influence of study validity on the results was not explored. The evidence presented supports the author’s conclusions.

Implications of the review for practice and research
Practice: The author states that both ibuprofen and paracetamol are effective antipyretics and both are well tolerated. He also states that ibuprofen appears to have a longer action and is more effective than paracetamol between 4 and 6 hours after administration, which may make it preferable in some circumstances.

Research: The author did not state any implications for further research.

Bibliographic details
Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Acetaminophen /therapeutic use; Analgesics, Non-Narcotic /therapeutic use; Child; Effect Modifier, Epidemiologic; Evidence-Based Medicine; Fever /drug therapy /nursing; Humans; Ibuprofen /therapeutic use; Patient Selection; Pediatric Nursing /methods; Research Design; Time Factors; Treatment Outcome

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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.