Review: no evidence exists that paracetamol and ibuprofen differ for short term pain relief or safety in children, but ibuprofen more effectively reduces fever

Perrott DA, Piira T, Goodenough B, *et al.* Efficacy and safety of acetaminophen vs ibuprofen for treating children's pain or fever: a meta-analysis. *Arch Pediatr Adolesc Med* 2004;**158**:521–6.

Q What is the relative effectiveness and safety of paracetamol (acetaminophen) and ibuprofen for short term treatment of pain and fever in children?

METHODS

Data sources: Medline, CINAHL, EMBASE/Excerpta Medica, Cochrane Library, Biological Abstracts, Biological Abstracts/RRM, Dissertation Abstracts International, Evidence-Based Medicine Reviews (EBMR) Best Evidence, EBMR Database of Abstracts of Reviews of Effectiveness, ERIC, Expanded Academic ASAP, General Science Abstracts, Health Reference Center Academic, Health Source Plus, Health Star, Oxford Pain Relief Database, PsycInfo, and Web of Science (all from inception to May 2002); bibliographies of relevant articles; websites; textbooks; and 4 key medical journals.

Study selection and assessment: randomised controlled trials (RCTs) of participants <18 years of age who were receiving either ibuprofen or paracetamol for fever or moderate to severe pain. Study exclusion criteria included use of previous or concurrent medication that could be a potential confounder.

Outcomes: pain, fever, and safety (minor or major harm). Minor harm was defined as the occurrence of an adverse event not leading to withdrawal from the study. Major harm was defined as the occurrence of an adverse event leading to withdrawal from the study.

Ibuprofen v paracetamol for short term treatment of pain or fever in children*

Outcomes	Number of trials (n)	Weighted RR point estimate (95% CI)†
Pain relief at 2 hours	3 (186)	1.14 (0.82 to 1.58)‡
Pain relief at 4 hours	3 (186)	1.11 (0.89 to 1.38)‡
Minor harm at median 48 hours	17 (1820)	0.96 (0.68 to 1.36)‡
Major harm at median 48 hours	17 (1813)	1.00 (0.55 to 1.82)‡
		Weighted effect size point estimate (CI)§
Fever reduction at 2 hours	10 (1078)	0.19 (0.05 to 0.33)
Fever reduction at 4 hours	10 (1078)	0.31 (0.19 to 0.44)
Fever reduction at 6 hours	10 (1078)	0.33 (0.19 to 0.47)

*RR = relative risk, CI = confidence interval.

†For pain, RRs > 1 indicate a greater likelihood of achieving >50% maximum pain relief with ibuprofen than with paracetamol. For harm, RRs > 1 indicate a greater likelihood of harm with ibuprofen than with paracetamol.

‡Not significant.

§An effect size of 0 represents equal effectiveness of the drugs for reducing fever; effect sizes > 0 represent superiority of ibuprofen over paracetamol.

MAIN RESULTS

17 RCTs (n = 1820) met the selection criteria. Most trials used single doses of 10 mg/kg of each drug and a double blind design. Meta-analysis was done using a fixed effects model. Meta-analysis of 3 trials of children with pain after dental extraction or sore throat pain showed that ibuprofen (4–10 mg/kg) and paracetamol (7–15 mg/kg) did not differ for short term pain relief (table). Meta-analysis of 17 trials showed that ibuprofen and paracetamol did not differ for incidences of minor or major harm (table). Meta-analysis of 10 trials that examined single doses of ibuprofen (5–10 mg/kg) and paracetamol (10–15 mg/kg) for fever showed that ibuprofen was more effective than paracetamol for reducing fever (table).

CONCLUSIONS

No evidence exists that paracetamol and ibuprofen differ for short term safety or relief of moderate to severe pain in children. Ibuprofen reduces fever more effectively than paracetamol.

Commentary

Because of its analgesic properties and lack of gastrointestinal side effects, paracetamol has long been seen as a relatively safe medication for the relief of fever and mild to moderate pain in children. Recently, however, ibuprofen has emerged as an alternative. With choice, questions invariably arise as to which drug is superior. Existing findings on the effectiveness and safety of these drugs in adults cannot be generalised to children. Thus, the meta-analysis by Perrott *et al* is of particular interest. The authors searched for relevant studies using numerous data sources, included only studies with randomised blinded designs, and verified the reliability of independently coded outcome measures with appropriate statistics. The authors stated that no unpublished studies were identified by hand searches, contact with pharmaceutical companies, or a posting on an international listserv. Nonetheless, the possibility exists that a publication bias of unknown size and direction may be operating.

Perrott *et al* did not find evidence that paracetamol and ibuprofen differ for short term pain relief or safety, but they did find that ibuprofen is more effective than paracetamol for treating fever. It is important to consider these results in the larger context of management of short term fever in children. Prolonged use of antipyretics to lower temperature has been known to mask symptoms of serious infection and cause liver damage and death in dehydrated children.¹ Some evidence suggests that non-pharmacological interventions, such as minimal clothing and extra drinks, may help to reduce fever in children, although sponging does not seem to have a long term effect.¹ Fever is often the body's normal response to infection, and simple non-pharmacological strategies may be all that is needed to reduce a fever. Nurses have a role in educating parents about the physiological basis of fever and the contribution of non-pharmacological interventions. Further research should focus on direct comparisons of various non-pharmacological interventions with antipyretic medications as well as the relative effectiveness of these drugs under usual multiple dosing situations, and their use in combination. Questions about safety will require large scale observational studies because adverse effects are rare.

Jeanette Robertson, RN, MSc, FRCNA
Women's and Children's Health Service
Perth, Western Australia, Australia

1 Watts R, Robertson J, Thomas G, and Review Panel. *The nursing management of fever in children. A systematic review.* Adelaide: Joanna Briggs Institute for Evidence Based Nursing and Midwifery, 2001.

For correspondence: Dr D A Perrott, TrialGraphix, Chicago, IL, USA.
dperrott@trialgraphix.com; dperrott@sbcglobal.net

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