

ENDGAMES

STATISTICAL QUESTION

Meta-analyses: sources of bias

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Researchers undertook a meta-analysis of the effectiveness of parenteral corticosteroids for the relief of acute severe migraine headaches and prevention of recurrent headaches in adults. Seven randomised placebo controlled trials were identified in which single dose parenteral dexamethasone was given in combination with standard abortive treatment.¹

Dexamethasone and placebo were found to provide similar acute pain relief. Dexamethasone was, however, reported to be more effective than placebo in preventing recurrent headaches within 72 hours (relative risk 0.74, 95% confidence interval 0.60 to 0.90).

Which of the following types of bias, if any, might have influenced the validity of the meta-analysis?

- a) Reporting bias
- b) Publication bias
- c) Language bias
- d) Citation bias

Answers

Answers *a*, *b*, *c*, and *d* are all types of bias that might have influenced the validity of the meta-analysis.

The meta-analysis investigated the effectiveness of parenteral corticosteroids for the relief of acute severe migraine headache and prevention of recurrent headaches. The results from the independent trials were combined to provide a single estimate that would be more precise than any of the individual trial estimates. The validity of the meta-analysis depended on all relevant randomised trials having been identified. Inappropriate treatment decisions could be made if the evidence was incomplete. Reporting bias is a broad encompassing term used

to describe a group of biases that might have influenced the identification of relevant trials (*a* is true). These biases include publication, language, and citation biases (*b*, *c*, and *d* are all true).

Publication bias (answer *b*) is the failure to include all relevant trials because they had not been published and were, therefore, not accessible. Studies may not have been published for a variety of reasons. If a trial failed to show a statistically significant difference between parenteral corticosteroids and placebo, or showed that placebo was superior to parenteral corticosteroids, it is less likely to have been submitted or even accepted for publication. Studies with large samples would have been more likely to be published, and publication could have been influenced by who funded the study or even the identity of the research group.

Language bias (answer *c*) is the selective inclusion of studies published typically only in English, because those published in any other language are not easily accessible. When relevant trials were identified their reference lists would have been examined for other possible studies. This may result in citation bias (answer *d*); that is, the tendency for those studies more frequently cited to be identified and, therefore, included in the meta-analysis.

Competing interests: None declared.

¹ Colman I, Friedman BW, Brown MD, Innes GD, Grafstein E, Roberts TE, et al. Parenteral dexamethasone for acute severe migraine headache: meta-analysis of randomised controlled trials for preventing recurrence. *BMJ* 2008;336:1359-61.

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