

ENDGAMES

STATISTICAL QUESTION

Bias in clinical trialsPhilip Sedgwick *senior lecturer in medical statistics*

Section of Medical and Healthcare Education, St George's, University of London, Tooting, London, UK

Researchers assessed the effects of full length 5 degree lateral wedge insoles on improving symptoms and slowing structural disease progression in medial knee osteoarthritis. A randomised double blind, controlled trial was performed. The control treatment was flat insoles. Both types of insole were worn inside the shoes daily for 12 months.¹

Participants were recruited from the community if they were aged 50 years or over and had a clinical and radiographic diagnosis of mild to moderately severe medial knee osteoarthritis. In total, 103 individuals were randomised to lateral wedge insoles and 97 to flat insoles. The primary symptomatic outcome was self rated overall knee pain in the past week. The primary structural outcome was volume of medial tibial cartilage from magnetic resonance imaging scans. For both outcomes, the change at 12 months from baseline was recorded. When compared with flat insoles, lateral wedge insoles provided no symptomatic or structural benefits when worn for 12 months.

Which of the following types of bias, if any, would have been minimised by the study design?

- Allocation bias
- Ascertainment bias
- Detection bias
- Assessor bias
- Response bias

Answers

Answers *a, b, c, d,* and *e* are all true.

Allocation bias is the systematic difference between participants in how they are allocated to treatment. Allocation bias did not occur as participants were randomised to the intervention (answer *a* is true). Each individual, therefore, had the same probability of being allocated wedged insoles or control insoles. As a result of random allocation, systematic differences in confounding factors between treatment groups at baseline were minimised, although not necessarily eliminated. Hence any differences in outcome between treatment groups when the trial ended would have been due to differences in treatment and not

to differences in characteristics at baseline. Allocation bias would have occurred, for example, if the researchers allocated those individuals to wedged insoles whom they thought would show the greatest benefit with that intervention. The researchers might have done this, for example, because they favoured wedged insoles and wished to show that they were more effective than flat insoles.

Ascertainment bias is the systematic distortion of the assessment of outcome measures by the investigators or trial participants because they are aware of treatment allocation. Ascertainment bias is sometimes referred to as detection bias. Because the trial was double blind, and it was unlikely that the investigators or participants became aware of treatment allocation, then ascertainment or detection bias would have been minimised (*b* and *c* are true).

Ascertainment bias would have occurred, for example, if the researchers favoured wedged insoles and wished to show that they were more effective. If the investigators were aware of treatment allocation, they could have been biased in their assessment—subconsciously or otherwise—towards the intervention of wedged insoles. Ascertainment bias would also have occurred, for example, if participants knew their treatment allocation; they might have been disappointed if allocated the control treatment of flat insoles and in their subjective report of pain might have given worse scores than were actually experienced, resulting in an exaggerated difference in outcome between the treatments. When ascertainment bias occurs on behalf of the investigators it is called assessor bias, and when on behalf of the participants it is called response bias. Therefore, because the trial was double blind, both assessor and response bias would have been minimised (*d* and *e* are true).

Competing interests: None declared.

¹ Bennell KL, Bowles K-A, Payne C, Cicuttini F, Williamson E, Forbes A, et al. Lateral wedge insoles for medial knee osteoarthritis: 12 month randomised controlled trial. *BMJ* 2011;342:d2912.

Cite this as: *BMJ* 2011;343:d4176