Childhood obesity as a risk factor for bone fracture: a mechanistic study.

OBJECTIVE: To investigate the risk of bone fracture sustained by obese children exposed to falls. The bone fracture risk of obese children would be greater than that of their nonobese counterparts was hypothesized.

DESIGN AND METHODS: Finite element-based computational models for children that reflected various levels of obesity by varying body mass and the thickness of the subcutaneous adipose tissue layer was developed. The models took account of both the momentum effect of variation of body mass and the cushion effect of variation of soft tissue thickness and examined these two contradictory effects on pelvic bone fracture risk through a set of sideways fall simulations with a range of impact speeds.

RESULTS: The critical impact speed that yielded pelvic bone fracture decreased as the levels of obesity increased, which meant that the momentum effect of a greater body mass took precedence over the cushion effect of the soft tissue layer.

CONCLUSIONS: The result suggests that obese children have a greater risk of pelvic bone fracture than do their nonobese counterparts in sideways falls. A further implication is that current child safety devices, systems, and regulations will need to be revisited as the prevalence of child obesity increases.
PubMed ID 23512354
PubMed Central ID PMC3740028
Grant List P30 DK056336 / DK / NIDDK NIH HHS / United States
P30DK56336 / DK / NIDDK NIH HHS / United States