

Obesity and Joint Injuries in Children

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Clinical Question

Does obesity in children increase the risk of joint injuries?

Evidence-Based Answer

Lower extremity injuries are 18% more likely in overweight children, 24% more likely in obese children, and 34% more likely in extremely obese children when compared with normal weight peers. The risk of lower extremity fractures is also increased by 17% in overweight children, 23% in obese children, and 45% in extremely obese children. Extremely obese prepubertal children have the greatest fracture risk at 2.2 times that of normal weight peers. Overweight and obese children do not have an increased risk of upper extremity injuries. Overweight children are also more likely to have persistent pain and swelling six months after an ankle sprain.

Evidence Summary

A large, retrospective, cross-sectional cohort study examined rates of upper and lower extremity injuries over two years in more than 910,000 children two to 19 years of age.¹ The children were stratified by weight. Compared with normal weight peers, children had an increased risk of lower extremity injury if they were overweight (body mass index [BMI] in the 85th to 95th percentile; odds ratio [OR] = 1.18; 95% confidence interval [CI], 1.15 to 1.20), obese (BMI in the 95th percentile to 1.2 × 95th percentile; OR = 1.24; 95% CI, 1.20 to 1.27), or extremely obese (BMI greater than 1.2 × 95th percentile; OR = 1.34; 95% CI, 1.30 to 1.39). Injuries included fractures (16% of patients); sprains of the hip, thigh, knee, ankle, or foot (57%); and dislocations (4%). Other patients had lower extremity pain without a

specific diagnosis. There was no association between obesity and upper extremity injuries or pain. Being underweight (BMI less than 5th percentile) was protective for injuries. Underweight children had fewer upper extremity (OR = 0.81; 95% CI, 0.75 to 0.86) and lower extremity (OR = 0.61; 95% CI, 0.57 to 0.66) injuries compared with normal weight children.

Another study reviewed the same database and specifically focused on fracture risk.² There was an increased risk of lower extremity fractures in children who were overweight (OR = 1.17; 95% CI, 1.10 to 1.25), moderately obese (OR = 1.23; 95% CI, 1.15 to 1.32), and extremely obese (OR = 1.45; 95% CI, 1.33 to 1.58) compared with normal weight children. The highest correlation between obesity and fracture was in children six to 11 years of age (overweight, OR = 1.58; 95% CI, 1.41 to 1.78; moderately obese, OR = 1.63; 95% CI, 1.44 to 1.84; and extremely obese, OR = 2.23; 95% CI, 1.92 to 2.59). In children two to five years of age and in those 12 to 19 years of age, the correlation was significant only in extremely obese children (OR = 1.89; 95% CI, 1.28 to 2.81; and OR = 1.10; 95% CI, 1.03 to 1.24, respectively).

Another large, retrospective, cross-sectional cohort study showed similar results in more than 23,000 children three to 14 years of age presenting to a pediatric emergency department with a traumatic injury.³ Obese children (BMI greater than 95th percentile) were more likely to present with lower extremity injuries (OR = 2.01; 95% CI, 1.85 to 2.17), but not upper extremity injuries (OR = 1.00; 95% CI, 0.93 to 1.08) compared with nonobese peers.

A retrospective, cross-sectional cohort study surveyed 2,459 Dutch families for ►

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Clinical Inquiries

injuries in their children within the prior two weeks.⁴ Investigators determined body habitus using self-reported height and weight. Overweight and obese children reported higher rates of recent lower extremity injuries (OR = 1.62; 95% CI, 1.09 to 2.41) but not upper extremity injuries (OR = 1.03; 95% CI, 0.36 to 2.98) compared with normal weight children. Obesity was not associated with more physician visits for musculoskeletal problems within the prior year.

A prospective cohort study enrolled 199 children eight to 18 years of age presenting to the emergency department with an acute ankle sprain.⁵ The patients were surveyed about their health status six months after the initial injury. Children with BMIs greater than the 85th percentile were more likely to report persistent pain with activity (OR = 2.25; 95% CI, 1.25 to 4.02) and persistent swelling or weakness (OR = 2.4; 95% CI, 1.28 to 4.52) than children with lower BMIs. Children with BMIs greater than the 95th percentile had similar outcomes.

Recommendations from Others

There are no expert recommendations specifically to reduce the risk of lower extremity injuries in children who are overweight or obese.

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REFERENCES

1. Adams AL, Kessler JI, Deramerian K, et al. Associations between childhood obesity and upper and lower extremity injuries. *Inj Prev*. 2013;19(3):191-197.
2. Kessler J, Koebnick C, Smith N, Adams A. Childhood obesity is associated with increased risk of most lower extremity fractures. *Clin Orthop Relat Res*. 2013; 471(4):1199-1207.
3. Pomerantz WJ, Timm NL, Gittelman MA. Injury patterns in obese versus nonobese children presenting to a pediatric emergency department. *Pediatrics*. 2010;125(4): 681-685.
4. Krul M, van der Wouden JC, Schellevis FG, van Suijlekom-Smit LW, Koes BW. Musculoskeletal problems in overweight and obese children. *Ann Fam Med*. 2009;7(4):352-356.
5. Timm NL, Grupp-Phelan J, Ho ML. Chronic ankle morbidity in obese children following an acute ankle injury. *Arch Pediatr Adolesc Med*. 2005;159(1):33-36. ■