Breaking Points: Fracture Risks in Obese Versus Non-Obese Children, A Propensity-Matched National Cohort Analysis of 1,153,855 Pediatric Patients

Pooya Hosseinzadeh, David A Momtaz, Jacob J Jahn, Jordan Eskenazi, Blaire Christine Peterson, Jad Jack Lawand, Abdullah Ghali, Rohit Siddabattula, Mahara Mohseni

INTRODUCTION:

Obesity in pediatric patients is a growing concern, particularly regarding its impact on the risk and type of fractures. However, detailed information on the specific fracture types and their respective risks in obese versus non-obese children is limited. This study aimed to elucidate the risk of various fractures in obese and non-obese pediatric patients.

METHODS:

A retrospective cohort study was conducted utilizing multi-institutional electronic medical records from 2003 to December 2023. 1,153,855 pediatric patients were identified. After matching for demographic factors, 278,999 patients were categorized into obese and an equal number to the non-obese cohorts based on BMI percentiles. A 6 year follow-up was conducted. Fracture incidence was compared between the two cohorts, and risk ratios were calculated for various fracture sites. Statistical analysis included chi-square tests and multivariable logistic regression models to adjust for potential confounders.

RESULTS:

The study found significant differences in fracture risks between obese and non-obese children. Obese children had lower risks of pelvis and hip (RR 0.80, 95% CI 0.74-0.86), shoulder (RR 0.64, 95% CI 0.60-0.68), humerus (RR 0.71, 95% CI 0.68-0.74), forearm (RR 0.94, 95% CI 0.91-0.96), and wrist and hand fractures (RR 0.88, 95% CI 0.86-0.90). However, they had significantly higher risks for fractures in the tibia, fibula, and ankle (RR 1.48, 95% CI 1.45-1.52), and foot (RR 1.19, 95% CI 1.15-1.22). No significant difference was observed for femur fractures (RR 0.95, 95% CI 0.89-1.01).

DISCUSSION AND CONCLUSION: This large-scale study highlights that while obese pediatric patients are at a lower risk for certain fractures, they have an elevated risk for fractures in the lower extremities, specifically the tibia, fibula, ankle, and foot.

Table 1. Pre-Match Characteristics
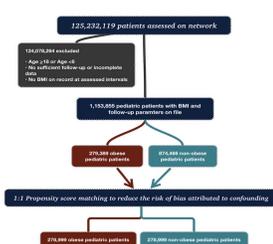
Characteristics	Obese 279,389 N or Mean	SD or %	Not-Obese 874,466 N or Mean	SD or %	P
Age	11.24	3.53	11.04	3.75	0.00
BMI Percentile	97.73	1.68	53.56	28.45	0.00
Male	147961	52.96%	429859	49.16%	0.00
Female	130219	46.61%	435978	49.86%	0.00
White	87628	31.36%	335372	38.35%	0.00
Black	48040	17.19%	129348	14.79%	0.00
Asian	7251	2.60%	42403	4.85%	0.00
Unknown Race	136,470	48.85%	367,343	42.01%	0.00
Hispanic	60678	21.72%	114008	13.04%	0.00

Table 2 - Post-Match Characteristics

Characteristics	Obese 278,999 N or Mean	SD or %	Not-Obese 278,999 N or Mean	SD or %	P
Age	11.24	3.53	11.24	3.53	0.99
BMI Percentile	97.73	1.68	54.50	28.46	0.00
Male	147961	53.03%	147972	53.04%	0.98
Female	130219	46.67%	130222	46.67%	1.00
White	87628	31.41%	87628	31.41%	1.00
Black	48040	17.22%	48046	17.22%	0.99
Asian	7251	2.60%	7251	2.60%	1.00
Unknown Race	136,080	48.77%	136,074	48.77%	1.00
Hispanic	60678	21.75%	60678	21.75%	1.00

Table 3 - Proportions & Risk

Variable	Obese	Not-Obese	Obese Proportion	Not-Obese Proportion	Risk Ratio	LB	UB	P-Value
Pelvis & Hip	347	434	0.12%	0.16%	0.80	0.74	0.86	0.00
Shoulder	627	985	0.22%	0.35%	0.64	0.60	0.68	0.00
Humerus	1,169	1,649	0.42%	0.59%	0.71	0.68	0.74	0.00
Forearm	3,709	3,966	1.33%	1.42%	0.94	0.91	0.96	0.00
Wrist & Hand	4,052	4,597	1.45%	1.65%	0.88	0.86	0.90	0.00
Femur	521	551	0.19%	0.20%	0.95	0.89	1.01	0.38
Tibia, Fibula, & Ankle	2,607	1,756	0.93%	0.63%	1.48	1.45	1.52	0.00
Foot	1,880	1,585	0.67%	0.57%	1.19	1.15	1.22	0.00