

Demographic Risk Factors for Non-Accidental Trauma in Children: A Case-Control Database Study

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INTRODUCTION: Fractures are the second most common presentation of non-accidental trauma (NAT) in the pediatric population, only preceded by skin injuries, and are a major cause of morbidity and mortality in this vulnerable population. Inconsistencies in history, multiple fractures, and bruises at different stages of healing, and previous history of abuse, are some of the risk factors for NAT in the literature. However, there is a need for demographic risk factor analysis in larger databases. The purpose of this study was to analyze a large worldwide database to determine the risk factors of NAT-associated fractures.

METHODS:

The US Collaborative Network in the TriNetX Research Network was used for this study, which is the largest database of deidentified electronic medical records from 55 healthcare organizations. TriNetX was searched for all inpatient and outpatient visits in children from 2015 to 2022, resulting in a cohort of over 32 million records, of which all fractures were extracted. Records were divided into accidental and non-accidental fractures and analyzed to determine the risk factors for NAT and the odds ratios for each factor. Statistical analysis was done on a combination of software packages for certain graphical representations.

RESULTS: Overall, 14,766,501 accidental and 10,837 fractures with complete data were included in the analysis. The mean age was 6 and 10 years for NAT and accidental fractures, respectively. Age under 4 years was a significant risk factor for NAT, with an odds ratio of 3.15 (95% UI 3.01 – 4.0, P<0.001) (Table 1). Age 2-3 had the highest rate of NAT associated fractures. Male sex was also a significant risk factor (OR: 1.14, 95%UI 1.1 – 1.45, P<0.001). Intellectual disability was the largest predictor of NAT (OR: 4.13, 95%UI 3.52 – 5.89, P<0.001). Autism and other behavioral and mental disorders were also risk factors for NAT (Figure 1).

DISCUSSION AND CONCLUSION:

In the largest epidemiologic study on NAT, we found that patients with intellectual disability are at the highest risk for NAT. In contrast to the current literature, we did not find evidence for children <1 year as having the highest risk. We found that patients <4 years are >3 times more likely to experience NAT, and in line with the literature, males have a slightly higher risk. Autism and behavioral disorders were also associated with an increased risk for NAT. The results of this study expand the literature on NAT, providing further evidence on the need for social, mental, and psychological support for vulnerable patients and families at high risk for NAT, and will hopefully help decrease the steady rate of NAT.

Table 1. Adjusted Odds Ratios

	Adjusted OR	95% UI	P
Sex			
Male	1.14	1.10 – 1.45	<0.0001
Female	0.74	0.71 – 0.94	<0.0001
Age			
Age <1	2.58	2.29 – 3.52	<0.0001
Age 1-2	3.18	2.95 – 4.17	<0.0001
Age 2-3	3.42	3.19 – 4.44	<0.0001
Age 3-4	3.08	2.88 – 4.00	<0.0001
Age groups			
Age <4	3.15	3.01 – 4.00	<0.0001
Age >4	0.27	0.26 – 0.34	<0.0001
Mental/Behavioral risk factors			
Intellectual Disability	4.13	3.52 – 5.89	<0.0001
Autism	1.56	1.39 – 2.12	<0.0001
Other Mental or Behavioral Disorders	2.36	2.26 – 3.00	<0.0001

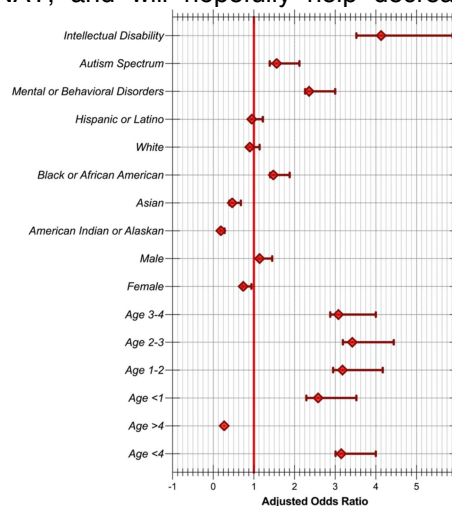


Figure 1. Forest plot of the risk factors analyzed in this study, with the lateral points indicating the 95%UI.