Identifying Risk Factors and Clinical Indications of Physical Abuse in Children: A Systematic Review

Alexandra F Flaherty, Samir Ghandour, Karina Mirochnik, Andreea Renata Lucaciu, Nour Nassour, Lorena Bejarano-Pineda, Soheil Ashkani Esfahani[1]
[1]Massachusetts General Hospital

INTRODUCTION:

Approximately one in four children in the United States experience child abuse or neglect in their lifetime, 18% of which are physically abused. According to the Center of Disease Control and Prevention (CDC), physical child abuse is “the intentional use of physical force that can result in physical injury. Examples include hitting, kicking, shaking, burning or other shows of force against a child.” Despite efforts to prevent and address physical child abuse, it remains a major public health issue. Given the physical nature of the resulting injuries, orthopaedic surgeons are often in a position in which they have to identify the difference between physical child abuse and accidental trauma. Key to this distinction is the presence of risk factors associated with physical child abuse. A substantial amount of research has been devoted to identifying these risk factors; however, this research either offer conflicting results or focus on specific subpopulations, limiting both definitive conclusions and generalizability. Given the important role orthopaedic surgeons have in identifying physical child abuse, it is essential to have a thorough understanding of the risk factors associated with physical child abuse. Therefore, the aim of this systematic review is to provide a comprehensive synthesis and analysis of recent literature on the risk factors associated with physical child abuse.

METHODS:

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline. A comprehensive search of the electronic databases PubMed (Medline, PubMed Central, and Embase was conducted for articles published in the last ten years. A combination of keywords and medical subject headings (MeSH) terms, including “abuse,” “risk factors,” and “children,” along with their variations were used. A total of 2,949 articles were identified. A sequential screening process was utilized, including title and abstract review and full text review, for which two reviewers independently screened each article according to concrete inclusion and exclusion criteria (Figure 1). The reviewed articles were cross-referenced for any additional relevant articles. Following the screening process, 61 articles were identified. Data extraction was conducted for these articles independently by two reviewers; a third reviewer established a consensus for the data from each article. A narrative synthesis of the included studies was conducted.

RESULTS:

Of the 61 included studies, there were 20 chart reviews, 4 prospective case-controls studies, 21 retrospective case-control studies, 1 cohort study, 9 cross-sectional studies, 2 ecological studies, and 4 population-based cohort studies. The sample sizes range from 39 to 2,902,285. In terms of risk factors, two categories were identified to stratify the type of risk factor: risk factors related to social determinants of heath (SDOH) and other risk factors (Table 1). The SDOH risk factors reported were younger age, male sex, African American or Hispanic race, non-private insurance, lower income, and lower maternal education. The other risk factors reported were prior report of child abuse, developmental disorders, musculoskeletal disorders, intellectual disability, birth defects, mood disorder, anxiety disorder, behavioral disorders, and autism spectrum disorder. In addition to risk factors, there are certain clinical and radiographic indications that may indicate possible child abuse (Table 2). The clinical signs found to be possibly indicative of child abuse included subdural hemorrhage, general head injury, eye injury, bruising, burns, and superficial skin injuries. The radiographic findings that are frequently associated with child abuse were skull fracture, intracranial hemorrhage, retinal hemorrhage, lung injury, femur fracture, tibial fracture, humeral fracture, and spinal fracture.

DISCUSSION AND CONCLUSION:

Physical child abuse remains a prevalent and serious problem. The risk factors that were mentioned as risk factors in numerous of the included studies should be strongly considered when evaluating a case of possible or suspected child abuse. Additionally, the clinical and radiographic signs found to be associated with child abuse should also be considered to potentially aid in the clinical decision making regarding the likelihood of abuse versus accidental trauma. Given the large number of orthopaedic related radiographic indicators and the physical nature of this particular type of child abuse, orthopaedic surgeons may often be in a position to recognize possible physical child abuse and to intervene. While there is some consensus regarding risk factors and medical indicators of child abuse, a more robust understanding of these factors is needed in order to improve the detection of child abuse in the healthcare system.

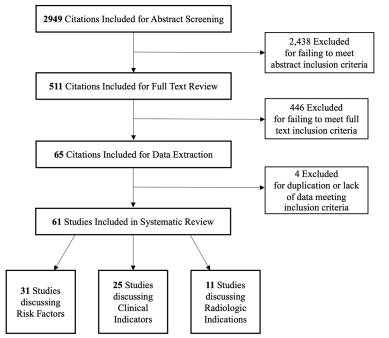

Figure 1: Methodologic flow of the screening, review, and data extraction process utilized in this systematic review. The sequential screening process is shown. Each step included independent review by two reviewers. The data extraction was carried out independently by two reviewers and then a consensus was established by a third reviewer. In the end, 61 studies were included.

Table 1: Risk factors associated with physical child abuse in the 61 included articles. The articles reporting each given risk factor are listed. Only risk factors with a statistically significant association are listed.

Risk Factors for Physical Child Abuse			
SDOH Risk Factors	Younger Age		Larimer et al.; Isiyel et al.; Sivasundaram et al.; Loos et al.; Selassie et al.; Xiang et al.; Ryznar et al.; Quiroz et al.; Quiroz et al.
	Male		Högberg et al.; Loos et al.; Xiang et al.; Gumbs et al.; Thalayasingam et al.
	Race	African American	Larimer et al.; Sivasundaram et al.; Raissian et al.
		Hispanic	Sivasundaram et al.; Raissian et al.; Ryznar et al.
	Non-Private Insurance		Larimer et al.; Sivasundaram et al.; Xiang et al.; Quiroz et al.
	Low Income		Isiyel et al.; Loos et al.; Selassie et al.; Anderson et al.; Xiang et al.
	Maternal Age		Gumbs et al.; Wu et al.
	Single Marital Status		Gumbs et al.; Kelly et al.
Other Risk Factors	Prior Report of Abuse		Damashek et al.; Raissian et al.; Notrica et al. Quiroz et al.; Kisely et al.
	Developmental Disorder		Sivasundaram et al.
	Musculoskeletal Disorder		Deans et al.
	Birth Defect or Congenital Abnormality		Högberg et al.; Deans et al.; Gumbs et al.; De Lea Sablonniere-Griffin et al.
	Intellectual Disability		Mc Donnell et al.
	Behavioral Disorder		Sivasundaram et al.; De Lea Sablonniere-Griffin et al.
	Mood or Anxiety Disorder		Sivasundaram et al.
	Autism Spectrum Disorder		Sivasundaram et al.; De Lea Sablonniere-Griffin et al.

Table 2: Clinical and radiologic indicators associated with physical child abuse in the 61 included articles. The articles reporting each given indicator are listed. Only indicators with a statistically significant association are listed.

Indicators of Physical Child Abuse		
Clinical Indicators	Bruising	Kemp et al.; Henry et al.
	Burn	Thackeray et al.; Quiroz et al.
	Eye Injury	Högberg et al.; Selassie et al.; Darling et al.; Deans et al.; Wu et al.
	General Head Injury	Larimer et al.; De Boer et al.; Selassie et al.; Rosenfeld et al.; Thackeray et al.; Henry et al.
	Multiple Injuries	Selassie et al.; Ryznar et al.
	Thoracic Injury	Larimer et al.; Rosenfeld et al.
	Superficial Skin Injuries	Deans et al.; Thackeray et al.; Gera et al; Rosado et al.; Lang et al.
Radiologic Indicators	Subdural Hemorrhage	Högberg et al.; Nobuyuki Akutsu et al.; Loos et al.; Kennedy et al.; Notrica et al; Thalayasingam et al.; Wu et al.; Giannakakos et al.
	Other Intracranial Hemorrhage or Injury	Selassie et al; Nobuyuki Akutsu et al.; Siesweda-Hoogendoorn et al.; Deans et al.; Barber et al.; Lang et al.
	Skull Fracture	Nobuyuki Akutsu et al.; Selassie et al.
	Retinal Injury	Weiss et al.; Selassie et al.; Darling et al.; Deans et al.; Wu et al.
	Femur Fracture	Sivasundaram et al.; Wu et al.
	Tibial Fracture	Sivasundaram et al.
	Spinal Facture	Sivasundaram et al.
	Humerus Fracture	Sivasundaram et al.