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Exploring the profile of articles on traumatic dental injuries in pediatric dental journals

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Abstract – *Aim*: To explore the profile of articles on traumatic dental injuries (TDI) published in leading pediatric dental journals between 2000 and 2010 via bibliometric analysis. *Methods*: A search was conducted on the PubMed database to find the six pediatric dental journals with the highest numbers of articles on TDI published between January 2000 and December 2010. All titles and abstracts of full-length articles were reviewed by two examiners. Studies focusing on TDI were independently categorized according to the following aspects: (i) year of publication; (ii) country where the study was carried out; (iii) study design; (iv) topic addressed; (v) type of TDI; and (vi) type of dentition. Data were analyzed in terms of frequency distribution. *Results*: Of a total of 3720 articles published in the six selected journals, only 119 (3.2%) focused on TDI, with no significant variations across the journals or years. The countries with the greatest number of publications on TDI were India (19.3%), followed by the USA (15.1%), Brazil (13.4%), and Italy (11.8%). Case report and case series were the dominant study design (53%). Most studies addressed treatment of TDI (63%) and described injuries to permanent teeth (68%), especially avulsion and crown fractures. *Conclusions*: There is an urgent need for expanding the number and quality of research on TDI in pediatric dental journals, especially with better quality study designs. Cohort studies and investigations focusing on the assessment of health services and technologies are important targets for future research.

About one-third of preschool children have sustained a traumatic dental injury (TDI) involving the primary dentition, and one-fourth of all schoolchildren have experienced trauma to the permanent dentition (1). In addition, there is emerging evidence that TDI have a negative impact on oral health-related quality of life (2–5). Therefore, it is particularly surprising that the percentage of articles focusing on TDI in pediatric dental journals has remained around only 3% over the past few decades (6). Considering that pediatric dental journals are a primary source of information for dental practitioners, patients may as a consequence not receive clinical treatment based on the best available evidence.

The analysis of scientific research published in biomedical fields is widely used to collect data for the development of scientific and technological policies, in a way that fully satisfies the needs of investigators, institutions, and health care administrators, with potential benefits also for the community (7–10). However, bibliometric analyses of articles published in pediatric dental journals are rare (10–12). Specifically with regard to TDI, identifying gaps in the pediatric dental literature is of paramount importance to stimulate investigators and research funding agencies to develop relevant projects that will contribute valid and relevant data to the international literature, with a high level of evidence and a potential to improve clinical practice and benefit the target population.

Therefore, the aim of this study was to explore the profile of articles on TDI published between 2000 and 2010 in six leading pediatric dental journals.

Methods

The analysis included all articles focusing on TDI published between January 2000 and December 2010 in six leading pediatric dental journals. Journals featuring articles on TDI in children and adolescents were identified in MEDLINE using the following search strategy: 'tooth injuries'[MeSH Major Topic] AND (jsubsetd [text] AND ('infant'[MeSH Terms] OR 'child'[MeSH Terms] OR 'adolescent'[MeSH Terms]) AND ('2000/01/01'[PDAT]: '2010/12/31'[PDAT])). The six pediatric dental journals with the highest numbers of articles focusing on TDI were selected for analysis by one of the authors. Pediatric journals were defined if the following terms were present in the journal's name: child, children, pediatric, paediatric or pedodontics.

All issues of the selected journals published between 2000 and 2010 were manually reviewed. At first, two experienced investigators read all titles and abstracts and independently selected all articles on TDI. Letters to the editors, editorials and abstracts were excluded from consideration. Articles were independently categorized according to the following aspects: (i) year of publication; (ii) country where the study was carried out; (iii) study design; (iv) topic addressed; (v) type of TDI; and (vi) type of dentition (primary or permanent).

Study design was classified into the following categories (13–15): systematic review, randomized clinical trial, quasi-experiment, cohort, case–control, cross-sectional, cost analysis, laboratory study, case report or case series, narrative review, bibliometric analysis, and opinion articles. Topic addressed was defined based on the main focus of the study, that is, the objective or research question that each study aimed to meet or answer. The following topic categories were established: frequency, etiology, or associated factors; diagnosis; prognosis; treatment; assessment of knowledge and attitudes; assessment of services; and literature evaluation. Type of TDI was defined according to Andreasen's classification (16). Whenever the abstracts failed to provide necessary information, the full texts were accessed and reviewed. Any disagreements between the two examiners regarding article classification were discussed until a consensus was reached.

Categories established for each variable were assigned codes and entered into independent spreadsheets and then subsequently compared using the Epi-Info software version 6.04 (Centers for Disease Control and Prevention, Atlanta, GA, USA). Data were analyzed using the Statistical Package for the Social Sciences (spss) version 16.0 (SPSS Inc., Chicago, IL, USA) and were expressed as simple and relative frequencies.

Results

The following pediatric dental journals showed the highest numbers of articles on TDI published in the period assessed: European Journal of Paediatric Dentistry (EJPD), International Journal of Paediatric Dentistry (IJPD), Journal of Clinical Pediatric Dentistry (JCPD), Journal of Dentistry for Children (JDC), Journal of Indian Society of Pedodontics and Preventive Dentistry (JISPPD), and Pediatric Dentistry (PD). The European Archives of Paediatric Dentistry has been also identified, but with a lower number of articles published in the period. Of a total of 3720 articles published in the six leading pediatric dental journals between 2000 and 2010, 119 focused on TDI (3.2%), with no significant differences across different years or journals (Table 1).

The contributions of different countries in the journals assessed are shown in Table 2. The countries with the highest numbers of articles on TDI were India (19.3%), the USA (15.1%), Brazil (13.4%), and Italy (11.8%), which accounted for more than half of the papers in the period assessed. Also, our findings revealed that 90% of the studies conducted in India and 70% of Italian studies were published in the JISPPD and in the EJPD, respectively. American studies were published exclusively in the journals JCPD, PD, and JDC. Finally, studies on TDI conducted in Brazil were present in all six journals assessed.

Case report/case series was the most frequent study design (52.9%), followed by cross-sectional studies (18.5%). Among the studies with high evidence levels, we found one systematic review and no clinical trials. Almost 80% of case reports and case series were published in three journals, namely JISPPD, JCPD, and PD, whereas more than half of the cross-sectional studies were published in JDC and IJPD. Finally, 80% of the narrative reviews were found in PD (Table 3).

Table 1. Distribution of articles on traumatic dental injuries published in pediatric dental journals between 2000 and 2010

	JISPPD[1] (*n*=492)	EJPD[2] (*n*=383)	JCPD[3] (*n*=759)	PD[4] (*n*=906)	JDC[5] (*n*=484)	IJPD[6] (*n*=696)	Total (*n*=3720)	
Year	Number of articles focusing on TDI							(%)
2000	1	1	2	4	0	4	12	3.85
2001	0	1	3	3	0	3	10	3.17
2002	1	0	4	3	1	2	11	3.38
2003	1	0	3	2	1	1	8	2.42
2004	2	0	1	4	3	1	11	3.54
2005	3	1	6	0	1	1	12	3.75
2006	3	3	2	1	1	1	11	3.18
2007	6	2	0	1	3	2	14	4.01
2008	2	0	1	0	1	0	4	1.12
2009	2	0	2	10	1	1	16	4.13
2010	1	5	1	1	2	0	10	2.71
Total	22 (4.5)	13 (3.4)	25 (3.3)	29 (3.2)	14 (2.9)	16 (2.3)	119	(3.2)

[1]Journal of Indian Society of Pedodontics and Preventive Dentistry.
[2]European Journal of Paediatric Dentistry.
[3]Journal of Clinical Pediatric Dentistry.
[4]Pediatric Dentistry.
[5]Journal of Dentistry for Children.
[6]International Journal of Paediatric Dentistry.

Table 2. Distribution of articles on traumatic dental injuries published in pediatric dental journals between 2000 and 2010 according to country

Country	JISPPD[1]	EJPD[2]	JCPD[3]	PD[4]	JDC[5]	IJPD[6]	Total	
							N	(%)
India	20	0	2	0	1	0	23	(19.3)
USA	0	0	4	11	3	0	18	(15.1)
Brazil	1	1	5	2	6	1	16	(13.4)
Italy	0	10	4	0	0	0	14	(11.8)
Israel	0	0	1	6	0	2	9	(7.6)
UK	0	1	0	3	0	5	9	(7.6)
Turkey	0	0	2	2	1	0	5	(4.2)
Denmark	0	0	0	3	0	1	4	(3.4)
Spain	0	0	2	0	1	1	4	(3.4)
Other	1	1	5	2	2	6	17	(14.3)

[1]Journal of Indian Society of Pedodontics and Preventive Dentistry.
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[3]Journal of Clinical Pediatric Dentistry.
[4]Pediatric Dentistry.
[5]Journal of Dentistry for Children.
[6]International Journal of Paediatric Dentistry.

The topic most frequently addressed in the 119 articles was treatment of TDI (63%), followed by prognosis (14.3%). In PD, 86% of the publications focused on treatment. JDC articles, in turn, predominantly addressed frequency, etiology, and factors associated with TDI (Table 4).

TDI involving exclusively the primary dentition accounted for one-fourth of all articles, compared with 68.1% of studies focusing specifically on permanent teeth. Avulsion (24.4%), crown fracture (16.6%), and intrusive luxation (12.6%) were the lesions most frequently reported in both primary and permanent teeth. When primary and permanent dentition were analyzed separately, intrusive luxation (20.7%) and avulsion (29.6%), respectively, were the most frequent topics (Table 5).

Discussion

According to our findings, pediatric dentistry publications are not meeting the demands of clinical practice with regard to TDI. Considering that dental traumatology and pediatric dentistry are strongly associated and that the prevalence of TDI is similar to the prevalence of caries in some age groups (17, 18), no rational argument can be given to justify the extremely low number of studies on TDI in pediatric dental journals. This result may be explained, at least in part, by the increasing importance of the journal's impact factor over the last decade. Articles of high methodological quality addressing trauma in children and adolescents are preferentially submitted to Dental Traumatology and journals on restorative dentistry, endodontics and oral surgery, which carry greater impact factor in comparison with pediatric dental journals. As a result, practitioners who seek scientific information in pediatric dental journals do not have access to TDI research findings. We expect that the recent studies pointing to the impact of TDI on quality of life of children and adolescents may stimulate investigators, research funding agencies, editors, and reviewers to prioritize this topic in their research projects and journals.

A geographic analysis of scientific production has shown that medical and dental research are clearly more consolidated in Europe, North America, and Australia/Oceania when compared with Asia, Africa, and South America (7, 19, 20). Previous analyses of the distribution of articles have strongly suggested an influence of economic and developmental aspects on scientific development. Insufficient research funding and poor infrastructure are probably the main limitations faced when performing and publishing research in developing countries (21).

In the 1980s and 1990s, dental trauma research was predominantly carried out in Scandinavia and USA (6). However, according to Andersson (22), Brazil and

Table 3. Distribution of articles on traumatic dental injuries published in pediatric dental journals between 2000 and 2010 according to study design

Study design	JISPPD[1]	EJPD[2]	JCPD[3]	PD[4]	JDC[5]	IJPD[6]	Total	
							N	(%)
Case report or case series	17	4	18	14	5	5	63	(52.9)
Cross sectional study	4	4	1	0	8	5	22	(18.5)
Narrative review	0	1	0	8	0	1	10	(8.4)
Cohort study	0	1	0	2	1	3	7	(5.9)
Specialist opinion	0	0	3	4	0	0	7	(5.9)
Laboratory study	1	2	2	0	0	0	5	(4.2)
Cost analysis	0	0	0	0	0	1	1	(0.8)
Bibliometric analysis	0	0	0	1	0	0	1	(0.8)
Case–control study	0	0	1	0	0	0	1	(0.8)
Quasi-experiment	0	1	0	0	0	0	1	(0.8)
Systematic review	0	0	0	0	0	1	1	(0.8)

[1]Journal of Indian Society of Pedodontics and Preventive Dentistry.
[2]European Journal of Paediatric Dentistry.
[3]Journal of Clinical Pediatric Dentistry.
[4]Pediatric Dentistry.
[5]Journal of Dentistry for Children.
[6]International Journal of Paediatric Dentistry.

Table 4. Distribution of articles on traumatic dental injuries published in pediatric dental journals between 2000 and 2010 according to topic addressed

Topic	JISPPD[1]	EJPD[2]	JCPD[3]	PD[4]	JDC[5]	IJPD[6]	Total	
							n	(%)
Treatment	14	7	16	25	3	10	75	(63.0)
Prognosis	4	2	6	2	2	1	17	(14.3)
Assessment of knowledge/attitudes	3	2	0	0	3	3	11	(9.2)
Frequency/Etiology/Associated factors	1	1	2	0	5	2	11	(9.2)
Diagnosis	0	1	1	1	0	0	3	(2.5)
Literature evaluation	0	0	0	1	0	0	1	(0.8)
Assessment of services	0	0	0	0	1	0	1	(0.8)

[1]Journal of Indian Society of Pedodontics and Preventive Dentistry.
[2]European Journal of Paediatric Dentistry.
[3]Journal of Clinical Pediatric Dentistry.
[4]Pediatric Dentistry.
[5]Journal of Dentistry for Children.
[6]International Journal of Paediatric Dentistry.

Table 5. Distribution of articles on traumatic dental injuries published in pediatric dental journals between 2000 and 2010 according to type of trauma and dentition

Type of trauma	Dentition			Total	
	Primary	Permanent	Primary and permanent	*n*	(%)
Avulsion	5	24	0	29	(24.4)
Crown fracture	3	17	0	20	(16.8)
Intrusive luxation	6	9	0	15	(12.6)
Crown-root fracture	0	5	0	5	(4.2)
Soft tissue injury	1	2	1	4	(3.4)
Lateral luxation	0	3	0	3	(2.5)
Root fracture	0	2	0	2	(1.7)
Extrusive luxation	0	2	0	2	(1.7)
Bone injury	0	1	1	2	(1.7)
Combined injuries	5	14	7	26	(21.8)
Not reported	9	2	0	11	(9.2)
Total: *n*/(%)	29 (24.4)	81 (68.1)	9 (7.5)	119	(100.0)

Turkey are currently the most productive countries in this field, with India and China coming next. The results of the present study reveal a similar phenomenon: India, Brazil, and Turkey accounted for nearly 40% of publications on TDI in the six leading pediatric dental journals.

Research on injuries and its use in various programs has been regarded as a primary reason for the rapid decline of injury-related death rates in high-income countries (23). Similarly, if research conducted in developing countries is adequately disseminated for the implementation of health policies and the improvement of clinical practice, it can also potentially bring important benefits to the population (24).

Our results demonstrated a high concentration of publications from some countries in local journals. Although the submission of manuscripts to local journals is a common habit among some investigators, this finding may also be reflecting, at least in part, a lack of interest of international journals in publishing findings from other settings. Nevertheless, TDI is a universal topic, that is, the country of origin should not be a barrier for the publication of these articles in international journals. New findings on TDI risk factors or TDI treatment represent important data that must be shared with the scientific community worldwide.

The contribution of TDI investigations to clinical practice is strongly linked to study design. The fact that most studies on TDI in pediatric dental journals are case reports or case series suggests the need for a more careful development of research projects by investigators. Case reports can describe characteristics of new diseases, formulate hypotheses regarding etiology, contribute to the recognition of disease mechanisms, report rare side effects of common diseases, propose treatment approaches for rare conditions and establish prognoses. Such reports also have the potential to stimulate further learning and research, but do not yield evidence that can be directly applied to clinical practice, because the conclusions are based on a few cases, the sample is not representative, a causal relationship cannot be ensured and there is no control group for comparison (13–15, 25, 26). Case reports on TDI appear justifiable only if reporting unusual and clinically relevant findings with a follow-up period of at least 3 years. With the increasing emphasis on evidence-based clinical decision-making in pediatric dentistry, attention is being placed on high quality studies, preferably clinical trials and cohort studies. If we decided to exclude articles with low levels of evidence from our analysis (case report or case series, opinion articles, and narrative reviews), we would end up with 39 articles, approximately 1% of all articles published in the period.

The development of prevention and treatment strategies for different conditions is best determined via randomized clinical trials or systematic reviews of randomized trials. However, TDI is an emergency condition, and compliance with some randomized clinical trial requirements (e.g., obtaining consent) may become a challenge. This situation probably discourages dental practitioners to undertake intervention studies with patients presenting with TDI (27) and could explain, at least in part, the virtual inexistence of randomized clinical trials and systematic reviews of randomized trials on TDI in pediatric dental journals.

Cohort studies represent an important source of evidence for TDI risk factors and prognosis and could potentially contribute to the development of prevention and treatment strategies. A cohort study is an investigation in which a defined group of individuals (the cohort) is followed over time to examine associations between different exposures (risk factor, disease, or intervention) and subsequent outcomes, allowing inferential analysis or at least an absolute risk estimate for the outcome (13, 15, 28). Otherwise, case series involve observations made on a series of individuals (usually all receiving the same intervention) before and after an intervention, but with no control group (15, 28). The low rate of cohort studies focusing on TDI in our study (29–35) shows that this is currently an open field for new projects, with the potential to reveal useful information that can be translated into clinical practice.

We already expected that the topics most frequently addressed in studies on TDI would be treatment and prognosis. Conversely, there is no excuse for the scarcity of studies focusing on the assessment of services and technologies, an essential topic for the provision of effective, equal, and cost-effective health care (36). One possible explanation could be the interdisciplinary nature of the treatment of TDI, starting at the emergency room and often including a long-term follow-up. Patients presenting with TDI are often referred to different professionals throughout the treatment course, involving not only pediatric dentists but also endodontists, surgeons, and orthodontists.

Another finding of our analysis refers to the low proportion of studies focusing on topics that may contribute to the prevention of TDI (e.g., etiology and associated factors) or to the minimization of TDI-related damage (e.g., assessment of knowledge and attitudes). We hope that studies focusing on these topics and including larger sample sizes will gradually replace case reports describing the treatment of one or a few patients. In this sense, the development of studies designed to evaluate the structure, processes, and outcomes obtained at interdisciplinary programs or services with TDI patients is highly encouraged.

The higher number of studies reporting TDI to permanent teeth can probably be explained by the fact that a relevant portion of injuries to the primary dentition either resolve spontaneously or do not require specific treatment. In addition, in some cases, treatment may consist of extraction of the affected tooth. Also, the minor importance attributed to primary teeth by dental professionals may also contribute to this finding. As the primary dentition is less likely to be of interest to journals on endodontics and restorative dentistry, the small proportion of articles on TDI in the primary dentition in pediatric dental journals is all the more troublesome. Taking into consideration the potential effects of TDI to primary teeth on the quality of life of preschool children (4) and the risk of severe damage to permanent dentition (16, 37, 38), investigations of TDI in primary teeth should become a primary goal of investigators and research funding agencies.

Our results on the dental injuries most commonly investigated in either primary or permanent teeth are easy to explain. Most studies investigating primary teeth focused on avulsion and intrusive luxation, possibly as a result of the strong impact that these injuries can determine, including risks of sequelae in permanent successors. In turn, the higher number of studies investigating avulsion and crown fracture in permanent teeth is probably explained by the strong impact and high prevalence of these injuries.

Medline was the only database accessed in the present study to retrieve the pediatric dental journals that published the most papers on TDI. We believe that this did not result in selection bias, as the aim of the search was to detect the six leading pediatric dental journals. These journals must necessarily be indexed in Medline, which is the main international databank of articles in the health field. The present study did not evaluate the methodological quality of the papers on TDI in the journals analyzed. Guidelines on conducting and reporting health research have been published, which could contribute to the clarification of this issue in future studies

In conclusion, our results showed that the number of publications on TDI in pediatric dental journals has remained consistently low and disproportionate in relation to the frequency and impact of this condition in clinical practice. Moreover, there is a scarcity of studies with high levels of evidence, which hinders the identification of effective strategies for the prevention and treatment of TDI. As a result, several contradictions between treatment concepts and clinical findings remain unresolved (27). Cohort studies involving patients with TDI and the assessment of health services and technologies represent relevant alternatives for future projects. Also, it is expected that the recent evidence pointing to the impact of TDI on quality of life may drive the attention of investigators and research funding agencies toward the need to increase the number and quality of investigations on TDI and motivate editors and reviewers of pediatric dental journals to reserve more space for these articles.

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