

Assess of Pediatric Oral Health-Related Quality in Children with Dental Injury

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ABSTRACT

Background: Traumatic dental injuries (TDI) are a significant public health concern, especially among children, with notable implications for both oral health and quality of life. These injuries, commonly affecting primary dentition, can have physical, psychological, and social impacts. Despite this, few studies have evaluated the effects of TDI on the oral health-related quality of life (OHRQoL) of children, particularly in specialized dental trauma care programs. This study aims to assess the impact of TDI on OHRQoL among preschool children and their families and to evaluate the psychometric properties of the Early Childhood Oral Health Impact Scale (ECOHIS) for this population.

Methods: A study was conducted at a Dental clinic ppl, involving children aged 2- 6 years with TDI. The sample included 146 children who met inclusion criteria from a total of 178 children with TDI. Data were collected through demographic questionnaires, TDI classification, and the version of the ECOHIS. Psychometric evaluations of the ECOHIS were performed, including reliability, test-retest, and construct validity assessments. Data analysis was conducted using SPSS, with statistical tests to compare the impact of uncomplicated versus complicated TDIs.

Results: The study found that 54.1% of the participants were male, with a mean age of 4.31 years. Central incisors were the most frequently injured teeth. The majority (90%) of children sought treatment more than 24 hours after the injury. The psychometric evaluation of the ECOHIS showed good reliability (Cronbach's $\alpha = 0.83$) and test-retest reliability (ICC = 0.79). The overall ECOHIS score indicated a moderate negative impact on OHRQoL (mean score = 6.79). Complicated TDIs significantly worsened the OHRQoL, with higher scores on both the total scale and specific subscales, particularly in child symptoms and function domains.

Conclusion: This study highlights the significant impact of TDI on the oral health-related quality of life of preschool children and their families, particularly when injuries are complicated. The ECOHIS demonstrated satisfactory reliability and validity for use in this population, offering a valuable tool for assessing the broader impacts of TDI in dental trauma care programs. These findings underscore the importance of timely treatment and the need for comprehensive care in improving the OHRQoL of children with dental injuries.

Keywords: ECOHIS, TDI, ICC, OHRQoL

INTRODUCTION

Traumatic dental injury (TDI) constitutes a current public health problem [1], and its risk factors as well as clinical and financial implications have been studied extensively [2-5]. It has an epidemiological relevance since it is very frequent in childhood, affecting 2 in 3 children before adulthood [6]. In children, considering the deciduous dentition stage, it presents a prevalence ranging from 9.7 to 39.1% [7- 10].

The dental aspect of health promotion and the relationship between oral health and quality of life has been the focus of dentistry professionals, mainly due to the relevance of oral problems and the physical and psychosocial impacts that it entails in the lives of children [11]. TDI acquires a special character among the causes of a negative impact on oral health-related quality of life (OHRQoL) because it has a high psychosocial impact [12-

14].

In the literature, there is no specific instrument to assess TDI, so the option is to use instruments developed for children that assess OHRQoL [11]. It is essential to assess the psychometric properties of all measures to aid the investigator who wishes to use an OHRQoL measure in TDI research, as they should exhibit consistent findings and confirm the validity and reliability of this instrument and add to the aforementioned works, providing some evidence to support the psychometric properties of the OHRQoL instrument [11].

TDI has been implicated as a compromising problem in children's health and on OHRQoL, which has been investigated in several cross-sectional studies carried out in daycare centers, public/private schools, or vaccination campaign days [12-23]. Thus, in view of the lack of reports about the OHRQoL of preschool children attending centers of reference for TDI, the objective of this study was to evaluate the impact of TDI on the OHRQoL of preschool children and their families who seek care in a dental trauma care program (DTCP) and also to evaluate the psychometric properties of an OHRQoL instrument on this population.

Subjects and Methods

Study Type and Sampling

This research utilized a cross-sectional design, sample was derived from patient records of individuals attending a Dental Trauma Care

Eligibility criteria included records of children aged 2 to 6 years. Excluded were records where parents were unable to complete the questionnaire due to comprehension issues or when questionnaires were completed more than three months post-TDI. Additional exclusions included confounding factors such as the use of interceptive orthodontic appliances or prostheses, active dental caries, and children with special needs (e.g., motor or mental disabilities or syndromic conditions).

Data Collection

Information was gathered regarding demographic characteristics (sex and age) and TDI specifics, such as the type of affected tooth and time elapsed before seeking care (categorized as immediate, 24 hours).

TDIs were classified according to Andreasen's criteria [25], including enamel fracture, enamel and dentin fracture, enamel and dentin fracture with pulp exposure, coronal and root fracture, and supporting tissue injuries (e.g., concussion, subluxation, lateral luxation, intrusive luxation, extrusive luxation, and avulsion). A dentist experienced in traumatology conducted clinical and radiographic examinations using the parallelism technique with radiographic positioners.

The severity of TDI was categorized as "uncomplicated" (pulpal tissue not exposed and no tooth displacement) or "complicated" (pulpal tissue exposed and/or tooth displacement) [26, 27]. If multiple diagnoses were present, the classification was based on the most severe injury.

To evaluate the impact on OHRQoL, the version of the Early Childhood Oral Health Impact Scale (ECOHIS) was utilized [19]. This instrument measures parents' perceptions of their child's OHRQoL through 13 items grouped into six domains: child symptom (1 item), child function (4 items), child psychological (2 items), child self-image/social interaction (2 items), parent distress (2 items), and family function (2 items). Responses were scored on a five-point scale ranging from 0 (never) to 4 (very often). The total ECOHIS score reflects the impact on OHRQoL, with higher scores indicating greater negative impact. Additionally, three global classification questions addressed oral health, general health, and well-being using five-point scales.

Instrument selection was guided by the Consensus-Based Standards for the Selection of Health Status Measurement Instruments (COSMIN) checklist, developed via an international Delphi study to facilitate evidence-based instrument selection [28, 29].

OHRQoL assessments were conducted through interviews by a trained individual not involved in the child's treatment, minimizing response bias due to potential embarrassment. Training, based on the COSMIN checklist [29], included a PowerPoint tutorial and 24 hours of calibration exercises, achieving satisfactory interrater agreement ($\kappa = 0.90$).

Data Analysis

Data were analyzed using SPSS 19.0. The Kolmogorov-Smirnov test confirmed normal data distribution, and mean total scores and subscale scores were calculated. Student's t-test compared the impact means for complicated versus uncomplicated TDI, with significance set at $p < 0.05$.

To ensure reproducibility, internal consistency was evaluated using Cronbach's α , and test-retest reliability was assessed via the intraclass correlation coefficient. Construct validity was determined by correlating scale scores with global health indicators (general and oral) and a well-being indicator using Pearson correlations. A pretest involving 26 parents (not included in the study) assessed question comprehension and instrument stability. Reliability was verified through a test-retest procedure, with the questionnaire reapplied after one week, and potential additions to the quality-of-life questions were evaluated at this stage.

RESULTS

From a total of 228 patients enrolled in the DTCP with TDI, 178 experienced trauma to the primary dentition. Among these, 146 met the inclusion criteria. The study experienced an 18% loss of participants, primarily due to incomplete patient records and difficulties with behavioral cooperation during clinical assessments for TDI.

The sample comprised children with an average age of 4.31 ± 1.68 years, with boys accounting for 54.1% of the group. Out of 248 affected teeth, the central incisors were the most frequently impacted: tooth 61 accounted for 43.6%, followed by tooth 51 at 39.2%. Treatment was sought in 90% of cases after a delay of more than 24 hours (mediate care), and 56.7% of the TDIs involved injuries to supporting tissues (Table 1).

Table 1: TDI Characterization

Category	Subcategory	n(%)
Tooth Type(n=248)		
	61	109 (43.6%)
	51	98 (39.2%)
	62	17 (6.8%)
	52	16 (6.4%)
	71	3 (1.5%)
	81	2 (1.0%)
	63	2 (1.0%)
Complexity of TDI(n =146)		
	Uncomplicated	114(78.0%)
	Complicated	32 (22.0%)
TDI Type–Support Tissue(n=137)		
	Concussion	72 (29.8%)
	Subluxation	21 (8.7%)
	Lateraldislocation	19 (7.9%)
	Intrusion	10 (4.1%)
	Extrusion	1 (0.4%)
	Avulsion	14 (5.8%)
TDI Type–Dental Tissue(n=105)		
	Enamel fracture	58 (23.9%)

The psychometric evaluation of the ECOHIS instrument demonstrated satisfactory reliability and validity for this population with TDI. Internal consistency was high (Cronbach's $\alpha = 0.83$), and test-retest reliability was confirmed with an intraclass correlation coefficient of 0.79. Construct validity showed significant correlations with oral health ($\rho = 0.241$, $p = 0.003$), general health ($\rho = 0.164$, $p = 0.047$), child well-being ($\rho = 0.522$, $p < 0.001$), and family well-being ($\rho = 0.521$, $p < 0.001$).

The mean scores for the ECOHIS questionnaire, including the total scale and the child and family subscales. The overall mean score was 6.79 ± 8.64 , with the child subscale averaging 4.29 ± 6.46 and the family subscale at 2.50 ± 3.06 . Complicated TDI had a significantly greater negative effect on OHRQoL, as reflected by higher scores on the total scale (9.34 ± 8.41 , $p = 0.036$), the child subscale (6.34 ± 6.05 , $p = 0.038$), the symptom domain (1.37 ± 1.26 , $p = 0.049$), and the function domain (3.03 ± 3.17 , $p = 0.030$).

DISCUSSION

Understanding the factors influencing OHRQoL within a population enables clinicians to prioritize timely interventions and strategies. It allows healthcare professionals to address not only the physical condition but also the psychosocial aspects associated with oral health issues. Dentistry plays a pivotal role in both systemic and local health, as well as in the psychosocial domain, particularly given the significant emotional expression conveyed through smiling. Traumatic dental injuries (TDI) are a significant public health concern, occurring frequently in children and carrying considerable epidemiological importance. Such injuries can inflict permanent damage to supporting structures and soft tissues, either immediately or in the long term, potentially leading to tooth loss. Therefore, beyond identifying TDI under clinical conditions, it is essential to evaluate its psychosocial repercussions.

Currently, no specific validated tool exists for assessing the psychosocial effects of TDI. The instrument used in

this study, along with others cited in the literature (15– 23), was the ECOHIS (19, 30), which is considered valid, reliable, and reproducible for populations according to prior studies. In this research, the tool was also applied to children aged six years, and its psychometric properties were evaluated in accordance with COSMIN guidelines (28, 29). The findings confirmed the instrument's validity and reliability, demonstrating satisfactory internal consistency, construct validity, and usability.

Research by Abanto et al. (15) and Aldrigui et al. (16) reported higher TDI scores across the total scale, child subscale, and family subscale compared to the current study. Aldrigui et al. (16) further explored the relationship between the type and severity of trauma, finding that complicated dental trauma had a greater adverse effect on OHRQoL, aligning with our results. Conversely, other studies (17–23) documented lower average impacts on OHRQoL across these scales.

The sample settings varied among studies. Research conducted by Viegas et al. (17), Kramer et al. (20), Scarpelli et al. (19), Siqueira et al. (18), Gomes et al. (21), and Vieira-Andrade et al. (23) took place in public and private daycare centers or schools. Aldrigui et al. (16) recruited children via a public university screening program, while Abanto et al. (15) collected data during national vaccination day at health centers. In contrast, Jesus et al. (10) focused on TDI prevalence among children aged 0–6 years at a dentoalveolar trauma reference center, and Fariniuk et al. (30) studied TDI cases treated at a trauma care service. However, neither Jesus et al. (10) nor Fariniuk et al. (30) assessed the OHRQoL impact, thus limiting their consideration of the broader health implications.

Previous evaluations of TDI's impact on OHRQoL within dental care programs primarily relied on caregivers' perceptions of their children's or adolescents' oral health (27) and family impacts (32). This study is the first to specifically assess the negative effects of TDI on the OHRQoL of preschool children, underscoring its importance. As a reference center in the region, the DTCP facilitates preventative measures and patient management with a more comprehensive and compassionate approach. This research effectively captured the significant negative influence of TDI on children's OHRQoL.

According to studies by Abanto et al. (15), Viegas et al. (17), Scarpelli et al. (19), Gomes et al. (21), and Vieira-Andrade et al. (23), uncomplicated TDI did not significantly affect the OHRQoL of children and their families. This aligns with the findings that uncomplicated injuries generally result in less severe consequences (14). However, in both Aldrigui et al. (16) and the current study, which included evaluations of complicated TDIs, it was evident that such injuries significantly impacted the OHRQoL of children .

This study has certain limitations. To enhance the understanding of these results, future research with larger sample sizes or conducted at other referral centers for preschool TDI cases is crucial. Additionally, assessing OHRQoL after treatment could provide valuable insights into potential improvements.

Given the validated and reliable OHRQoL instrument used in this research, it is clear that TDI negatively affects children's quality of life, especially in cases of complicated injuries. This study highlights the importance of addressing the psychosocial impacts of TDI, providing clinicians and health professionals with essential data for effective planning and decision-making. Furthermore, it emphasizes the need for DTCPs to ensure accessible care for affected populations.

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