

# Comparative Study of Dental Pain Between Children With and Without a History of Maltreatment

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**Aims:** To assess the presence of dental pain in child abuse victims and to compare the findings to children in the same age group with no history of abuse in a Southern Brazilian city. **Methods:** This cross-sectional comparative study was carried out in a convenience sample of 68 child abuse victims from a center for psychologic support and in a comparative group of 204 students from public and private schools, all aged between 8 and 12 years. Data for socioeconomic and demographic variables were collected, and information regarding dental pain in the last 6 months was obtained via interviews with the children. World Health Organization criteria were used to assess the presence of decayed, missing, or filled teeth in primary and permanent dentition. Dental trauma was measured using the O'Brien Index, and gingival bleeding was assessed. Crude and adjusted logistic regression analyses were performed to assess the association between dental pain and history of abuse. **Results:** Reporting of dental pain was higher among child abuse victims (54.41%) than in the comparative group (36.14%) ( $P < .01$ ). After adjustment for clinical variables in the logistic regression analyses, the child abuse victims group had an odds ratio of 2.03 (95% confidence interval 1.13 to 3.64) for dental pain ( $P = .01$ ). **Conclusion:** Child abuse victims presented a higher prevalence of dental pain than children with no history of maltreatment, regardless of oral health status. *J Oral Facial Pain Headache* 2019;33:287–293. doi: 10.11607/ofph.2291

**Keywords:** child, child abuse, oral health, pain, toothache

The World Health Organization (WHO) has defined child maltreatment as all forms of physical and emotional maltreatment, sexual abuse, neglect, and exploitation that result in actual or potential harm to the child's health, development, or dignity.<sup>1</sup> Maltreatment can lead to poor physical and mental health<sup>2–4</sup> and behavioral<sup>5,6</sup> and economic consequences<sup>7,8</sup> throughout the victim's life.

Regarding oral health, some studies have shown that child abuse victims tend to show higher rates of dental caries<sup>9,10</sup> and other oral health problems,<sup>9,11</sup> whereas other studies failed to find this association.<sup>12</sup> In addition, a recent study showed that abuse had a higher impact on children's oral health–related quality of life (OHRQoL). The authors found that a group of child abuse victims exhibited a higher impact on OHRQoL than the group of non-abuse victims in all subscales, and this association was statistically significant for oral symptoms, including perception of pain and discomfort.<sup>13</sup> The authors explained that the impaired perception about oral health in child abuse may be due to the trauma caused by violence, resulting in a more negative perception than children who did not have this history.

Dental pain is a common problem in the general population, and studies have shown that this condition affects patients' quality of life.<sup>14–16</sup> Dental pain can adversely affect learning, communication, nutrition, and other activities necessary for normal growth and development of children and adolescents.<sup>17</sup> A review of epidemiologic studies indicated that the global prevalence of dental pain in children and adolescents ranges from 5% to 33%.<sup>16</sup> The most common cause of dental pain is dental caries.<sup>16,18</sup> However, beyond the oral health condition, other factors may predispose individuals to dental pain even in the absence of an

organic disease. Environmental,<sup>19</sup> contextual,<sup>20</sup> emotional, and psychologic<sup>21</sup> factors are related to the perception of pain. Child victims of abuse are often placed in a hostile environment and are exposed to multiple problems and stressors as well as a lack of attention and care, and their general and oral health are usually neglected. It is possible that this could be associated with a higher pain perception.

No studies to date have investigated dental pain in child abuse victims. Thus, the aim of this study was to assess the presence of dental pain in child abuse victims and to compare these findings with those in children of the same age group with no history of abuse in a Southern Brazilian city. The study hypothesis was that child abuse victims would exhibit a greater prevalence of dental pain than children who had not been abused and/or neglected.

## Materials and Methods

### Ethical Aspects

This study was approved by the Human Research Ethics Committee of the Federal University of Pelotas (Protocol number: 1.267.179). Children and their parents or legal guardians were invited to participate, and those who signed the informed consent form were included. Individuals who required any dental treatment were referred to the public oral health service.

### Study Design and Sampling

A cross-sectional comparative study was carried out in a convenience sample of 68 child abuse victims aged 8 to 12 years from a center for Child and Adolescent Psychological Support (NACA, the acronym in Portuguese). All children referred to the center between November 2015 and November 2016 were invited to participate in this study, and after acceptance, the children were included in the child abuse victims group. Individuals with any form of mental disability and/or unable to answer the questions were excluded. A group of students in the same age range from public and private schools composed the comparative group. Three children from the comparative group were selected for each child abused. Both groups of children lived in Pelotas, a southern Brazilian city of approximately 344,385 inhabitants.<sup>22</sup>

All agencies responsible for the protection of children and adolescents (Tutelary Council or Police Station for Children and Adolescents or Public Ministry) in the city refer cases to the NACA on receiving notification of any type of abuse (sexual, physical, and/or psychologic abuse and neglect). The NACA center has a team of psychologists and social workers that provide legal, social, and psychologic support to the children and their families.

The comparative group was obtained from the database of a multidisciplinary epidemiologic study on schoolchildren. This study evaluated a representative sample of children attending 15 public and 5 private schools. Additional information regarding the study on schoolchildren can be obtained from the article describing the methodology.<sup>23</sup>

Children from groups were matched by sex, age, type of school (public or private), and geographic location of the school (same school or school in the same neighborhood as the children of the child abuse victims group). After selection of children for the comparative group, verification was carried out in the NACA center records to determine whether these children had a history of abuse. Four children were in the registries as victims of maltreatment and were excluded from the sample and replaced by four other children not registered in the records of the center.

### Data Collection

Socioeconomic and demographic variables (age, sex, family income, and type of school) were collected, and clinical examination was performed. Data for the socioeconomic and demographic variables in the child abuse victims group were obtained from the NACA records. Information regarding family income in the last month was collected in terms of Brazilian minimum wage (BMW), which corresponds to approximately US \$270 and was dichotomized into  $\leq 2$  BMW and  $> 2$  BMW.

For the comparative group, family income was determined through a self-administered questionnaire answered by the participants' parents. Information for income was collected in Brazilian reals and was also dichotomized into  $\leq 2$  BMW and  $> 2$  BMW, taking into account the BMW at the time. Age and sex were determined through interviews with the children at school. The type of school was categorized as public and private.

In both groups, dental fear was assessed using the question "Are you afraid of going to the dentist?" The possible answers were "no"; "yes, a little"; "yes, quite"; and "yes, very." For this study, the dental fear variable was dichotomized to "no" or "yes" (when children answered "yes, a little"; "yes, quite"; or "yes, very").<sup>24</sup>

### Clinical Examination

For both groups, the oral clinical examinations were conducted in a private room under artificial light and following all the biosafety standards recommended by the WHO.<sup>25</sup> Untreated dental caries were measured using the decayed (d), missing (m), or filled (f) teeth (dmft) index for the deciduous dentition and the Decayed (D), Missing (M), or Filled (F) Teeth (DMFT) index for the permanent dentition. Only the decayed component (d/D) was used for adjustment, and a

child was considered to have untreated dental caries when they had at least one untreated carious tooth in the deciduous or permanent dentition.

To evaluate the presence of dental trauma, the O'Brien Index<sup>26</sup> was used and dichotomized into "present" (when the children had any type of dental trauma considered by the index in at least one of the anterior teeth examined) or as "absent" (when the children showed no sign of dental trauma in any of the teeth assessed). Gingival bleeding was assessed by gently probing the Community Periodontal Index (CPI) probe along the gingival sulcus of the four sites (mesial, buccal, distal, and palatal/lingual) of six index teeth (16 or 55, 11, 26 or 65, 36 or 75, 31, 46 or 85). When the teeth had an orthodontic band, were destroyed, missing due to decay, or in eruption, the neighboring teeth were evaluated. Gingivitis was considered to be present when at least one of the four sites showed bleeding on any of the teeth evaluated.<sup>27</sup>

To ensure reliability, a training and calibration process was carried out for both groups. For the child abuse victims group, a single examiner, who also received 4 hours of theoretical training in all of the indices, performed the clinical examinations. Calibration of the dmft and DMFT indices (dental caries status) was carried out with scholars, and calibration of dental trauma assessments was performed in lux, with the projection of 20 photographs. The kappa in comparison with a gold standard (assessments performed by a professor in pediatric dentistry) was 0.86 for dmft/DMFT and 0.80 for dental trauma. For gingival bleeding, training was administered by presenting 15 images to set the criteria to be used.

For the comparative group, a fieldwork team of six postgraduate dental students received 4 hours of theoretical training in the indices used. Training and calibration were performed with children of the same age group from a school not included in the study. The kappa value was 0.74 for dmft/DMFT and 0.92 for dental trauma. Further details can be found elsewhere.<sup>23</sup>

### Dependent Variable

Information regarding dental pain was collected in both groups from a face-to-face interview by trained interviewers through the question "Have you had dental pain in the last 6 months?" The possible answers were "yes" and "no."<sup>15</sup>

### Statistical Analyses

Data were analyzed using Stata 13.1 software. Descriptive analyses were performed to characterize the sample, while chi-square test and Fisher exact test were used to compare the two groups according to age, sex, family income, type of school,

untreated dental caries, dental trauma, dental fear, gingival bleeding, and dental pain. Crude and adjusted logistic regression analyses were used to assess the associations between dental pain and independent variables selected based on literature review (age, sex, family income, untreated dental caries, dental trauma, dental fear, and gingival bleeding).<sup>16,21,28</sup> Odds ratios (ORs) and corresponding 95% confidence intervals (95% CI) were estimated. Variables were introduced in the adjusted analysis independent of the *P* values in the crude analysis. Differences were considered statistically significant when *P* < .05.

## Results

A total of 68 child abuse victims were included. No child or guardian refused to participate or was excluded according to the exclusion criteria. Thus, a comparative group of 204 children was included. The sample achieved had 76% power to detect differences in the prevalence of dental pain between groups, with a level of confidence of 5%. The characteristics of the child abuse victims group and the comparative group with respect to the socioeconomic and demographic characteristics and dental pain are presented in Table 1. The results showed that the presence of dental pain in the last 6 months was higher among child abuse victims (54.41%) than in the comparative group (36.14%) (*P* < .01). No intergroup difference was observed with respect to dental trauma, untreated caries, gingival bleeding, or dental fear. Family income was also similar between the two groups, with family income up to 2 BMW reported for 76.47% of the participants in the child abuse victim group and 75.28% of those in the comparative group (*P* = .84). Age, sex, and type of school were used as matching variables and yielded *P* values of 1.00, as expected. A majority of the participants in the sample were females (55.88%) and from public schools (92.65%).

The presence of dental pain in the child abuse and comparative groups according to socioeconomic and clinical variables is shown in Table 2. No statistically significant difference was found between the groups. The result showed that in both groups, dental pain was more prevalent in female participants (*P* = .82) and those with family income ≤ 2 BMW (*P* = .23). In assessments based on clinical variables, both groups showed a higher prevalence of pain among those who had untreated dental caries (*P* = .25) and gingival bleeding (*P* = .33). When the analyses were performed within each group, differences in the occurrence of dental pain were detected only in the comparative group (for age and family income).

**Table 1 Characteristics of Child Abuse Victims (n = 68) in Comparison to Non-Abused Schoolchildren (n = 204)**

	Child abuse victims n (%)	Comparative group n (%)	<i>P</i> value
<b>Age (y)</b>			
8	17 (25.00)	51 (25.00)	1.00
9	12 (17.65)	36 (17.65)	
10	19 (27.94)	57 (27.94)	
11	9 (13.24)	27 (13.24)	
12	11 (16.18)	33 (16.18)	
<b>Sex</b>			
Male	30 (44.12)	90 (44.12)	1.00
Female	38 (55.88)	114 (55.88)	
<b>Family income<sup>a</sup></b>			
≤ 2 BMW	52 (76.47)	134 (75.28)	.84
> 2 BMW	16 (23.53)	44 (24.72)	
<b>Type of school</b>			
Private	5 (7.35)	15 (7.35)	1.00
Public	63 (92.65)	189 (92.65)	
<b>Untreated dental caries</b>			
Absent	31 (45.59)	86 (42.16)	.62
Present	37 (54.41)	118 (57.84)	
<b>Dental trauma</b>			
Absent	52 (76.47)	175 (85.78)	.07
Present	16 (23.53)	29 (14.22)	
<b>Dental fear<sup>a</sup></b>			
Absent	49 (72.06)	153 (75.37)	.5
Present	19 (27.94)	50 (24.63)	
<b>Gingival bleeding</b>			
Absent	06 (08.82)	32 (15.69)	.15
Present	62 (91.18)	172 (84.31)	
<b>Dental pain<sup>a</sup></b>			
No	31 (45.59)	129 (63.86)	<b>&lt; .01</b>
Yes	37 (54.41)	73 (36.14)	

BMW = Brazilian minimum wage. *P* values obtained from chi-square test.

Bolded *P* values are significant.

<sup>a</sup>Missing data.

Table 3 shows the results of logistic regression analyses of the association between dental pain and independent variables. After adjustment, the child abuse victims group had an OR of 2.03 (95% confidence interval [CI] 1.13 to 3.64) for dental pain (*P* = .01).

## Discussion

To the best of the present authors' knowledge, this is the first study investigating the presence of dental pain in victims of child abuse in comparison with children showing no history of maltreatment. Dental pain and child abuse are relevant problems and have important short- and long-term consequences on individuals' lives.<sup>2-6,14-16</sup> The findings of this study confirmed the hypothesis that child abuse victims report more dental pain than children in the comparative group.

The main cause of dental pain is the presence of dental caries.<sup>15,16,18</sup> However, in this study, even after adjusting for untreated dental caries, children in the abuse victims group reported a higher perception of dental pain than children with no history of abuse. This finding is in agreement with the new definition of pain proposed by The International Association for the Study of Pain, which, in addition to associating pain with actual or potential tissue damage, recognizes the emotional, social, and cognitive components of pain, as well as its ability to be a subjective experience.<sup>29</sup>

Another factor that should be considered in perceived dental pain is the environment. As child abuse often occurs in the child's own home, with someone in the family nucleus being the aggressor in most cases,<sup>30</sup> the environment in which the child lives tends to be based on fear, anxiety, and hostility. Considering the fact that environment not only modifies pain expressions but may also modify predisposition to certain painful conditions,<sup>19</sup> it is possible to suppose that the hostile environment in which the child abuse victims are inserted can influence their greater perception of dental pain. This mechanism can be explained through the current neurophysiologic concepts of pain that recognize that a specific pathologic process is neither necessary nor sufficient to cause dental pain.<sup>16</sup>

There is evidence that pain is also triggered by psychologic factors. It is known that most victims of child abuse experience chronic domestic violence<sup>31,32</sup> and are consequently exposed to several stressful events. Studies have shown that exposure to four or more traumatic and stressful events during childhood puts children at high risk for psychologic dysfunction<sup>33</sup> because childhood is a key period for maturation and development of the stress response system.<sup>34</sup> Since individuals exposed to stressful events may present lower pain thresholds,<sup>19,35</sup> maltreated children can experience enhanced perceptions of dental pain as an indirect result of the stressful events experienced during their history of maltreatment.

Posttraumatic stress disorder (PTSD) is another hypothesis that may justify the greater occurrence of dental pain in victims of child abuse. Although PTSD was not evaluated, evidence shows that individuals who undergo adverse experiences in life may develop this condition.<sup>31</sup> The symptoms of PTSD include frightening thoughts and memories, anxiety, depression, and sleep difficulties. Defrin et al (2015)<sup>36</sup> have shown a relationship between the presence of chronic pain and PTSD, and Power et al

**Table 2** Presence of Dental Pain Between Groups According to Socioeconomic and Clinical Variables

Independent variables	Total sample (n = 110/272), n (%)	Child abuse victims (n = 37/68), n (%)	Comparative group (n = 73/204), n (%)	P value between groups
<b>Sex</b>				
Male	46 (41.82)	16 (43.24)	30 (41.10)	
Female	64 (58.18)	21 (56.76)	43 (58.90)	
P value		.87	.45	.82
<b>Age (y)</b>				
8	20 (18.18)	08 (21.62)	12 (16.44)	
9	23 (20.91)	06 (16.22)	17 (23.29)	
10	27 (24.55)	12 (32.43)	15 (20.55)	
11	18 (16.36)	05 (13.51)	13 (17.81)	
12	22 (20.00)	06 (16.22)	16 (21.92)	
P value		.90	<b>.02</b>	.64
<b>Family income<sup>a</sup></b>				
Up to 2 BMW	85 (81.73)	28 (75.68)	57 (85.07)	
More than 2 BMW	19 (18.27)	09 (24.32)	10 (14.93)	
P value		.86	<b>.01</b>	.23
<b>Untreated dental caries</b>				
Absent	42 (38.18)	14 (37.84)	28 (38.36)	
Present	68 (61.82)	23 (62.16)	45 (61.64)	
P value		.16	.63	.25
<b>Dental trauma</b>				
Absent	91 (82.73)	29 (78.38)	62 (84.93)	
Present	19 (17.27)	08 (21.62)	11 (15.07)	
P value		.68	.82	.39
<b>Dental fear<sup>a</sup></b>				
Absence	81 (74.31)	28 (75.68)	53 (73.61)	
Present	28 (25.69)	09 (24.32)	19 (26.39)	
P value		.46	.53	.81
<b>Gingival bleeding</b>				
Absent	12 (10.91)	02 (05.41)	10 (13.70)	
Present	98 (89.09)	35 (94.59)	63 (86.30)	
P value		.40 <sup>b</sup>	.68	.33 <sup>b</sup>

P values obtained using chi-square test unless otherwise indicated. Bolded P values are significant.

<sup>a</sup>Missing data.

<sup>b</sup>P value obtained using Fisher exact test.

(2014)<sup>37</sup> suggested that PTSD may be a mediator between childhood maltreatment and the experience of pain in adulthood. Thus, it is possible to infer a relationship between dental pain in child abuse victims and PTSD.

In the same line, victims of child abuse are at higher risk for mental illnesses such as depression and anxiety.<sup>31</sup> Individuals who have these disorders may develop greater perception of pain as a consequence of the underlying condition affecting their ability to deal with pain perception.<sup>19</sup> Several biologic and neurochemical theories have been put forth to explain the increased pain perception in depressive individuals<sup>38,39</sup>; however, this aspect is still not well established. One study showed that mental illness was not a mediator between abuse and pain, and according to the authors, both abuse and depression can contribute independently of higher pain perception.<sup>40</sup>

Another factor that cannot be ruled out is the “use” of pain as a defense mechanism.<sup>19</sup>

**Table 3** Crude and Adjusted Odds Ratios (OR) for Report of Dental Pain in Child Abuse Victims and Comparative Group

	Crude OR (95% CI)	P value	Adjusted OR (95% CI) <sup>a</sup>	P value
Child abuse victims		<b>.009</b>		<b>.018</b>
Comparative group	1.00		1.00	
Child abuse victims	2.10 (1.20–3.68)		2.03 (1.13–3.64)	

Logistic regression analysis with dental pain as the dependent variable.

Bolded values are significant. CI = confidence interval.

<sup>a</sup>Adjusted by age, sex, family income, untreated dental caries, dental trauma, dental fear, and gingival bleeding.

From this perspective, a victim of child abuse may complain of pain to gain greater visibility in the home environment, to attempt to be better cared for, or as a way to protect against future episodes of abuse (when the perpetrator lives in the same environment).

Dental pain is a condition that imposes some limitations for children, causing a negative impact on their emotional status, sleep patterns, and ability to learn or perform usual activities such as eating and sleeping, which are essential



for the development and maintenance of health.<sup>21</sup> Additionally, this problem affects the physical status of individuals, as well as their psychologic well-being and social interactions.<sup>41</sup> Since childhood maltreatment also has serious consequences for the child's life, such as deficits in educational achievement, anxiety, depression, and physical health problems,<sup>31</sup> it is possible to infer that the association of dental pain may potentiate the sequelae and further worsen the QoL of the child. These findings highlight the importance of dental health professionals in support teams for victims of maltreatment, since these professionals may facilitate improvement in the child's oral health, consequently reducing sequelae and improving the QoL of the child.

Traditionally, oral health outcomes are evaluated using normative clinical indices that measure health conditions according to the professional's judgment, ignoring the patients' subjective demands and not taking into account social and psychologic factors, thereby giving a low importance to the self-perception of the individuals. In this study, the evaluation of dental pain was performed from the child's point of view through self-reporting, necessitating considerations for the subjectivity of this outcome and the fact that the experience of pain varies greatly between individuals. Nevertheless, literature considers self-reporting as the gold standard in the assessment of pediatric pain because information is easily collected and is free of any input from parents or guardians.<sup>42</sup> The fact that all types of abuse were included and violence was diagnosed by qualified professionals are valuable points in this study. The 1:3 ratio used for pairing between groups is also a positive point, as it allowed a bigger sample size and therefore improved the accuracy and statistical power of the study.<sup>43</sup>

Although this study has some strengths, some limitations should be mentioned. The possibility of recall bias in reports of pain should be considered. Since information about pain was collected retrospectively, it is possible that children who had previous episodes of pain of short duration and intensity reported less pain because they may only remember past episodes of greater pain intensity. The studies in the literature show great variations in the time periods for dental pain questionnaires. The measurement of the prevalence of dental pain can be conceptualized as the frequency of an existing disease or condition over a defined period of time.<sup>44</sup> Thus, because dental pain is usually a symptom of acute disease that is quickly relieved with treatment, an estimate measure at a certain point in time may be very low. Although the use of 4-week instruments to measure dental pain reduces the risk of memory bias,<sup>18,45</sup> the assessment of longer periods, such as the 6-month instrument used in this study, may be beneficial since it also allows

inclusion of pain of longer duration, such as recurrent pain caused by untreated dental disease.<sup>21</sup> The time period used in this study was the same as that used in previous studies.<sup>21,46–48</sup> Another possible limitation is that the use of children's self-reports may also lead to an increase in the rate of positive responses due to their underdeveloped cognitive abilities and the manner in which they perceive pain. Noteworthy, only the prevalence of pain was measured, and the intensity or magnitude of the pain was not able to be evaluated.

In addition, the children were not examined for some clinical aspects, such as pulpitis or apical periodontitis in previously treated teeth, that are considered relevant when evaluating dental pain. Thus, these conditions could not be used as adjustment variables. Based on this limitation, it cannot be safely attributed that the greater occurrence of dental pain among victims of child abuse is explained only from a biopsychosocial perspective.

Finally, although this was case-comparative research and NACA was the only referral center for child abuse in the city, it cannot be guaranteed that no member of the comparative group was actually a victim of some form of maltreatment, since intra-familial violence is a silent phenomenon and diagnosis is often arduous.<sup>32</sup> However, the necessary care was taken to ensure that this did not occur.

## Conclusions

These findings indicate that victims of child abuse show a higher occurrence of dental pain than children without this history regardless of their oral health status, reinforcing the idea that contextual and emotional factors may be associated with pain perception.

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