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Prevalence and impact of oral pain in 8-year-old children in Sri Lanka

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Summary. *Objective.* The present study aimed to determine the prevalence and impact of oral pain in 8-year-old Sri Lankan children and their parents.

Design. A cross-sectional study using a multistage cluster sampling technique was carried out in a sample of 614 children attending schools in the Education Division of Badulla, Uva province, Sri Lanka. Data were collected by means of a pre-tested questionnaire that was sent to each of the children and their parents. The children were also given an oral examination. Of the 614 questionnaires which were sent to parents, 30 were not returned and eight had to be excluded from the analysis because the respondents had answered only two questions. Therefore, the present analysis is limited to data from 576 children and their parents.

Results. The lifetime prevalences of oral pain, as reported by the children and parents, were 49% and 53%, respectively. According to the children's report, 25% had experienced oral pain in the past 2 months while 31% of the parents reported that their child had experienced oral pain within the same period. Of those children who reported that they had experienced oral pain in the past 2 months, nearly 45% stated that the pain was severe. In 48%, the pain was triggered when biting. 'Presence of cavity/decayed tooth' was cited as the most common cause of oral pain (67%). Overall, 74% of children had experienced a negative impact as a result of the pain whilst 66% of the parents said that the child's pain had had an impact on them. Ethnic group, parental income and level of education, and the caries experience of the child were significantly associated with the reporting of oral pain in the past 2 months.

Conclusions. The prevalence of oral pain was high among these children, and had a considerable impact on both the children and their parents.

Introduction

The International Association for the Study of Pain defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [1]. Pain is perceived as a result of a neurophysiological process, which is influenced in turn by various socio-cultural and psychological factors related to a particular individual. Pain is a common and frequently reported symptom of oral disease [2], and has a marked impact on the psychosocial well-being of both children and adults [3–5]. Although the principle pathological cause of oral pain is dental caries and its sequelae, causes other than dental caries, such as trauma to teeth, eruption of permanent teeth and exfoliating primary teeth, can give rise to oral pain [3].

Pain has been cited as a common reason for children to seek dental care [6,7]. However, only a few attempts have been made to determine the prevalence of oral pain and its impact on children, and these studies have been mainly confined to child populations from developed countries [3,8,9]. The dearth of literature on this subject may be a result of the widely held assumption that children are unable to assess pain reliably.

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In Sri Lanka, oral diseases are a common reported cause of morbidity among children. The second National Oral Health survey [10] reported that 76% of 6-year-olds had caries in their primary teeth. The prevalence of caries was 53% and 70% in 12- and 15-year-olds, respectively. A high proportion (68–87%) of children had periodontal disease. Although pain is recognized as a common symptom of caries especially, no study to date has evaluated either the extent to which Sri Lankan children have experienced pain caused by oral disease or the impact that had resulted from such pain. Therefore, the aim of the present study was to assess the prevalence and the impact of oral pain in 8-year-old Sri Lankan children and their parents.

Subjects and methods

The present study was carried out in the Education Division of Badulla, an area in the Uva province of Sri Lanka, between July and September 2002. The study population consisted of 8-year-old children attending schools in this education division. Data obtained from the education authorities indicated that the total population of 8-year-olds in the Education Division of Badulla is 1509.

Because data on the prevalence of oral pain were not available for Sri Lankan children, the prevalence of oral pain in 8-year-olds was considered to be 50% for the purpose of calculating the sample size. Accordingly, the minimum sample size required for the present study, using a prevalence estimate of 50% at the 95% level of confidence and accepting a sampling error of 5%, was 384. Multistage cluster sampling, combined with probability proportionate to size technique, was used to select the sample. Because the cluster sampling procedure was used, it was necessary to make adjustments for the 'design effect', which was estimated as 1·5 [11]. This meant that, to obtain the same precision, the sample size needed to be 1·5 times more than the calculated sample size of 384. Therefore, after adjusting for the design effect and compensating for non-respondents (10%), the sample size required for the study was 614.

The sample was selected in two stages. It was decided to include 36 clusters of 8-year-olds since this corresponds to the number of schools with a primary section in the Education Division of Badulla. According to the information obtained from the education authorities, it was found that children who had had their eighth birthday but not their ninth were in the Year 4 class. In the first stage of cluster sampling, the sampling unit was the 'school'. The 36 clusters were identified from 22 schools according to the probability proportionate to size technique. In the second stage, 17–18 children from the Year 4 class who satisfied the age criterion were randomly selected from each cluster. Accordingly, the final sample consisted of 614 children.

The data were collected by means of a pre-tested questionnaire sent to each of the children and their parents. The questionnaire consisted of two parts: Part A for the child, and Part B for her or his parents. A total of 17 questions were included in Part A. These elicited information on past experience of oral pain and the degree of oral pain assessed using a three-point scale: mild, moderate and severe pain; trigger factors and possible reasons for the pain; the impact of pain on the child; and the response to pain by the parents. Part B consisted of 13 questions for the parents pertaining to basic socio-demographic information: whether their child had experienced oral pain; possible reasons for the pain; and its impact on the parents. The questionnaire was pre-tested on a group of 30, 8-year-olds and their parents from a different province to prevent contamination of the study sample, and minor language modifications were made accordingly. The first author (N.R.) administered the questionnaire to the children in the form of an interview in the classroom. This was followed by an oral examination using World Health Organization Basic Methods [12] to assess the level of dental caries. The oral examination was conducted outdoors while the child was seated on a school chair by the first author, who was calibrated with a consultant in Dental Public Health prior to the commencement of the study. Intra-examiner and intra-interviewer reproducibility were assessed by re-interviewing and re-examining five children at the end of each day. Each child was given her or his parents' questionnaire to be filled up by the parents and returned to the class teacher within a week of distribution.

Ethical clearance was obtained from the Ethical Review Committee of the Faculty of Medicine, University of Colombo, Columbo, Sri Lanka. In addition, permission was obtained from the Provincial Director of Education and the principals of the relevant schools. Written informed consent was obtained from the parents of the children.

The SPSS for Windows, Version 10·0, statistical package was used for data analysis. The associations

between categorical data were determined by chi-square test.

Results

A total of 614 children were included in the sample. However, of the 614 questionnaires sent to parents, 30 were not returned, giving an overall response rate of 95%. Furthermore, of the 584 questionnaires which were returned, there were eight questionnaires where the respondents had answered only two questions (gender of child and ethnicity). These were excluded from the analysis. Therefore, the present analysis is limited to data from only 576 children and their parents.

Fifty-two per cent (300) of the sample consisted of boys. The majority of the children were Sinhalese (73%), whilst 15% ($n = 84$) and 12% ($n = 72$) were Tamils and Moors, respectively. Fourteen per cent ($n = 79$) of parents had received primary education, while 47% ($n = 261$) had passed the General Certificate of Education (advanced level) or a higher examination. The parental income of 60% ($n = 304$) of the children was less than 6000 rupees.

The lifetime prevalences of oral pain, as reported by the children and parents, were 49% ($n = 278$) and 53% ($n = 301$), respectively. Nearly 25% ($n = 139$) of children had reported that they had experienced oral pain during the past 2 months, whilst 31% ($n = 178$) of parents reported that their child had experienced oral pain during the same period (Table 1).

A description of oral pain experienced during the past 2 months, as reported by the child, is shown in Table 2. The majority of children had experienced three or more episodes of pain (41%). Nearly 45% ($n = 61$) had stated that the pain was severe. In 48% ($n = 66$) of the children, the pain had been triggered when biting and 39% ($n = 54$) stated that the pain had developed spontaneously. When the causes for pain were considered, 'cavity/tooth decay' was cited as the main cause of pain by 67% ($n = 91$) of the children. However, only 21% ($n = 27$) had been taken for dental treatment by their parents, while 12% had been given painkillers. A high proportion (44%) had stated that their parents did not do anything for their pain.

Table 3 shows the impact of oral pain on the children and their parents. Of the 139 children who had experienced oral pain in the past 2 months, 74% ($n = 103$) had experienced one or more impacts as a result of the pain. 'Difficulty in eating' was the most commonly reported impact (58%). Forty per cent ($n = 55$) said that the pain prevented them from playing and 22% ($n = 30$) were unable to attend school. Of the 178 parents who reported that their child had experienced oral pain in the past 2 months, 66% ($n = 118$) had reported that the child's pain had an impact on them. The most commonly cited impact was 'mental suffering' and was reported by 52% ($n =$

Table 2. Description of oral pain experienced in the past 2 months, as reported by children ($n = 139$).*

Variable	Number	Percentage
Number of episodes of pain:		
one	45	33·1
two	35	25·7
three or more	56	41·2
Degree of pain:		
mild	35	25·6
moderate	41	29·9
severe	61	44·5
Trigger of pain:		
eating sweets	7	5·1
taking hot/cold food and drinks	9	6·6
biting	66	48·2
spontaneously	54	39·4
others	1	0·7
Reasons for pain:		
loose tooth	8	5·9
oral ulcers	22	16·3
erupting tooth	4	3·0
cavity/decayed tooth	91	67·4
others	3	2·2
don't know	7	5·2
Parents' response to pain:		
did not do any thing	56	44·1
pain killers given	15	11·8
taken for treatment	27	21·3
others	29	22·8

*Totals in the different categories do not add up to 139 because there were missing values.

Table 1. Prevalence of oral pain in children.

	Lifetime experience of oral pain		Oral pain experienced in the past 2 months	
Variable	Number*	Percentage	Number	Percentage
According to child	278 (573)	48·5	139 (568)	24·5
According to parent	301 (572)	52·6	178 (574)	31·0

*Total number of respondents given in brackets.

Table 3. Distribution of impacts associated with the experience of oral pain in the past 2 months.

Impacts associated with oral pain	Number	Percentage
*Impact on child (according to child)**		
Experienced one or more impact	103	74·1
Absent from school	30	21·6
Difficulty in eating	80	57·6
Sleep disturbances	44	31·7
Prevented from playing	55	39·6
Impact on parents (according to parents)†		
Experienced one or more impact	118	66·9
Had to take time off work	56	31·5
Daily activities affected	54	30·3
Sleep disturbances	69	38·8
Mental suffering	92	51·7

*Number of children who reported experiencing oral pain = 139.
†Number of parents who reported that their child experienced oral pain in the past 2 months = 178.

92) of parents. Sleep patterns were disturbed for 39% ($n = 69$) of parents and 31% had to take time off work ($n = 56$).

The associations between oral pain experienced during the past 2 months, as reported by the child, and some selected variables are shown in Table 4. The ethnic origin of the child was significantly associated with the experience of oral pain, in that 38% ($n = 32$) of Tamil children had experienced pain compared to 21% ($n = 85$) of Sinhalese children. Both the level of education and income of the parents were significantly associated with the reporting of pain by the child. The children of parents with higher levels of education and income were less likely to experience oral pain. There was a concomitant increase in the percentage of children who had experienced oral pain in the past 2 months with the increase in experience of caries ($P < 0·001$). Thirty-eight per cent ($n = 53$) of the children who had four or more decayed, missing, or filled primary and permanent teeth had experienced oral pain compared to 27% ($n = 22$) of those who had one such primary or permanent tooth.

The associations between the degree of oral pain experienced in the past 2 months and the impacts reported by the children are presented in Table 5. It can be seen that two impacts, namely 'difficulty in eating' and 'sleep disturbance', were significantly associated with the degree of pain. The percentage of children who had stated that they had difficulty in eating and that their sleep was affected increased with the increase in the severity of pain.

Discussion

The aim of the present study was to assess the prevalence of oral pain in 8-year-old children. Hitherto,

Table 4. Associations between oral pain experienced during the past 2 months, as reported by children, and some selected variables.

Variable	Experienced pain during the past 2 months		χ^2 value	*P*-value
	Number*	Percentage		
Gender:				
boys	78 (298)	26·2		
girls	61 (270)	22·6	0·983	0·321
Ethnicity:				
Sinhala	85 (411)	20·7		
Tamil	32 (84)	38·1		
Moor	21 (71)	29·6	12·66	0·002
Parents' level of education:				
GCE ('O' Level) or less	95 (295)	32·2		
GCE ('A' Level) or more	42 (259)	16·2	18·93	< 0·001
Monthly income (Rupees):				
< 3000	33 (109)	30·3		
3001–6000	56 (189)	29·6		
> 6001	34 (206)	16·5	11·23	0·003
Caries experience:				
0	20 (189)	10·6		
1	24 (88)	27·3		
2	22 (86)	25·6		
3	20 (65)	30·8		
≥ 4	53 (140)	37·9	35·12	< 0·001

*Total number of subjects in each category given in brackets.
(χ^2) chi-square; and (GCE) General Certificate of Education.

Table 5. Associations between the degree of pain experienced during the past 2 months and the impacts reported by the child.

	Degree of pain						
	Mild		Moderate		Severe		
Impact	Number*	Percentage	Number*	Percentage	Number*	Percentage	*P*-value
Absent from school:							
yes	5 (30)	16·7	11 (30)	26·8	14 (30)	46·7	0·405
no	30 (107)	28·0	30 (107)	28·0	47 (107)	43·9	
Difficulty in eating:							
yes	17 (80)	21·3	20 (80)	25·0	43 (80)	53·8	
no	18 (56)	32·4	20 (56)	35·7	18 (56)	32·1	0·044
Sleep disturbances:							
yes	6 (44)	13·6	11 (44)	25·0	27 (44)	61·4	
no	29 (93)	31·2	30 (93)	32·3	34 (93)	36·6	0·016
Play affected:							
yes	11 (55)	20·0	15 (55)	27·3	29 (55)	52·7	
no	24 (80)	30·0	25 (80)	31·3	31 (80)	38·8	0·239

*Total number of subjects in each category given in brackets.

other studies cited in the literature have considered only dental pain or toothache in children [3,9]. Oral pain indicates pain within the mouth [13], whereas dental pain has been described as 'pain that originates from innervated tissues within the tooth or immediately adjacent to it' [14]. The term 'toothache' has been considered synonymous with dental pain in the dental literature [15]. However, there could be situations where an individual may sometimes not be capable of accurately differentiating whether the pain is of dental origin or not. As a result, there is a possibility that pain rising from other origins is erroneously attributed to dental pain or toothache, thus giving rise to false positives. In fact, there is evidence that dental pain has been reported for children with no evidence of dental caries [7]. Therefore, it was decided to consider oral pain instead of dental pain in the present study.

The prevalence of oral pain, whether in terms of lifetime experience or prevalence in the preceding 2 months, was greater according to the parents than the children. This could be because of several reasons. It is possible that the children under-reported their experience of oral pain simply as a result of the fear that they would be forced to undergo dental treatment if they gave a history of pain. In addition, recall bias may also have resulted in the under-reporting of oral pain by the children. On the other hand, in families with a large number of children, there is a possibility that parents may report one child's experience of oral pain as that of another.

The lifetime prevalence of oral pain, as reported by the children, was 49%, whereas figures ranging from 48% to 88% have been reported as lifetime prevalence for dental pain for a similar age group in other studies [3,9,16]. Moreover, in the present study, nearly 24% of children had stated that they had experienced oral pain in the past 2 months. This is markedly lower than the prevalence rate of 70% reported by Naidoo *et al*. [9] for a similar period of time. Variations in disease patterns and severity, particularly the levels of dental caries, may be an explanation for the differences observed between these studies.

With respect to the degree of pain, most of the children in the present study had rated the pain that they had experienced as severe (40%), which is in agreement with the findings from other studies [3,9]. Conversely, when Bailit [17] assessed the degree of pain in 5–13-year-olds, he found that less than 1% had experienced severe pain. However, in contrast to the present study, where the degree of pain was recorded according to the children's reports, Bailit had used the parent's reports. This could be a possible reason for the observed difference between the studies.

The most important trigger of oral pain, as reported by the children, was 'biting'. A similar finding was noted by Shepherd *et al*. [2]. Of those who had experienced oral pain in the past 2 months, 44% stated that her or his parents did not take any action to alleviate the pain, whereas only 21% had sought dental care. In contrast, Shepherd *et al*. [2] reported that for 42% of children professional help had been sought for their dental pain. A possible explanation for the difference may be that Shepherd *et al*. conducted their study in an affluent area in London, UK, where children may have had ready access to dental care.

However, there are only three school dental clinics which provide care to children under the age of 13 years and one hospital dental clinic in the area where the present study was carried out. Limited accessibility to these clinics may have prevented the parents from seeking dental care for their child's oral pain.

'Cavity/decayed tooth' was cited as the most common cause of oral pain by the children in the present study. This is in agreement with the findings of Slade [15], who concluded after an extensive survey of the literature that dental caries was the most consistent clinical correlate of dental pain. Nevertheless, about 27% of the children participating in the present study gave reasons other than caries for the pain that they had experienced within the previous 2 months. This highlights the fact that a significant proportion of children experience pain as a result of non-dental aetiology.

Oral pain had a significant effect on the well-being of the children, with 74% reporting one or more negative impact as a result of the pain. The most commonly reported impact was 'difficulty in eating', and this is in agreement with the findings of Shepherd *et al*. [3]. In an earlier study, Slade *et al*. [8] reported that 32% of 7-year-olds had experienced disturbed sleep because of toothache, which is consistent with the findings of the present study. As expected, the oral pain experience of the child had a negative impact on the parents too. Overall, negative impacts were reported by 66% of the parents. In a recent study assessing the impact of child orofacial conditions on the family, Locker *et al*. [18] found that 75% of parents had experienced negative impacts as a result of their child's problem. Considering the various types of impacts which have been reported, the present study and that of Locker *et al*. [18] strongly suggest that oro-facial conditions of the child could affect parents' daily activities as well as parental emotions.

Apart from assessing the prevalence and impact of oral pain, the present study also attempted to establish the associations between the reporting of oral pain and certain socio-demographic variables, and the caries experience of the child. The results revealed that there was a significant association between ethnic group and the reporting of oral pain. The prevalence of oral pain was highest in Tamil children. This may be a reflection of socio-economic status rather than ethnic group *per se*, since most of the parents of these children were estate labourers who belonged to the lower socio-economic class. There is clear evidence that, regardless of their age, the children from lower socio-economic groups experience more toothache than those from higher socio-economic groups [19]. The significant association observed between the parents' monthly income and the reporting of oral pain in the present study further substantiates this point. The results also revealed a significant association between caries experience and oral pain, supporting the findings of Slade *et al*. [8] and Mitropoulos [20]. Compared to 11% with no evidence of dental caries, 89% of children with dental caries had experienced oral pain in the preceding 2 months.

In conclusion, the findings of the present study indicate that the prevalence of oral pain was high among children, and had a considerable impact on the quality of life of both the children and their parents. School dental therapists play a key role in the provision of dental care to schoolchildren under the age of 13 years in Sri Lanka, and conducting outreach oral healthcare activities is one of their main duties. Since a high proportion of children who had experienced oral pain had not been taken for dental treatment by their parents, it is recommended that these outreach oral healthcare activities are conducted more regularly to cover a wider number of schools than at present. Thus, the school dental therapists at least would be able to identify children with oral pain and relieve them of their suffering by providing the necessary care during these programmes.

Résumé. *Objectif.* Cette étude a eu pour objectif de déterminer la prévalence et l'impact de la douleur buccale chez des enfants sri lankais de 8 ans et chez leurs parents.
Protocole. Une étude transversale utilisant une technique d'échantillonnage particulière a été menée chez 614 enfants fréquentant les écoles de la division éducationnelle de Badulla. Les données ont été collectées par questionnaire pré-testé auprès de chacun des enfants et des parents. 30 des 614 questionnaires envoyés aux parents n'ont pas été retournés et 8 ont du être exclus de l'analyse car les répondants n'avaient répondu qu'à 2 questions. L'analyse s'est donc limitée aux données issues de 576 enfants et de leurs parents.
Résultats. La prévalence de la douleur buccale, selon les enfants et les parents a été de 49% et 53% respectivement. Selon les enfants, 25% avaient déjà eu mal dans les 2 mois précédents tandis que 31% des parents rapportaient une douleur chez leur enfant

durant la même période. Parmi les enfants déclarant une douleur buccale dans les 2 mois précédents, environ 45% rapportaient une douleur sévère. Chez 48%, la douleur avait été déclenchée en mordant. 'La présence de dent cariée/avec une cavité' a été cite comme la cause la plus fréquente de douleur (67%). D'une façon générale 74% des enfants avaient vécu une expérience négative liée à la douleur tandis que 66% des parents rapportaient que la douleur chez leur enfant avait eu une répercussion sur eux. Le groupe ethnique, les revenus parentaux, le niveau d'éducation et le passé carieux de l'enfant étaient significativement associés au fait de rapporter une douleur buccale dans les deux mois précédents.
Conclusions. La prévalence des douleurs buccales était importante chez ces enfants et avait des répercussions considérables sur les enfants et les parents.

Zusammenfassung. *Ziel*. Diese Untersuchung zielte darauf, Prävalenz und Wirkung von Zahnschmerzen bei achtjährigen Kindern in Sri Lanka sowie deren Eltern zu ermitteln.
Design. Querschnittstudie unter Anwendung einer mehrstufigen Cluster-Stichprobenbildung, durchgeführt anhand einer Gruppe von 614 Kindern, welche Schulen des Badulla Schulbezirks besuchen.
Methode. Die Daten wurden anhand eines vorgestesteten Fragebogens für Kind und Eltern erhoben. Die Kinder wurden weiterhin zahnärztlich untersucht. Von den 614 Fragebogen, welche den Eltern zugesandt wurden, kamen 30 nicht zurück, acht weitere wurden ausgeschlossen, da nur je zwei Fragen beantwortet waren. Somit konnten nur die Daten von 576 Kindern und deren Eltern analysiert werden.
Ergebnisse. Die Lebenszeitprävalenz von Zahnschmerzen nach Angaben von Kindern und Eltern lag bei 49% bzw. 53%. Nach Angaben der Kinder hatten 25% innerhalb der vorangegangenen zwei Monate Zahnschmerzen gehabt, nach Angaben der Eltern lag dieser Wert bei 31%. Von denjenigen, welche Schmerzen innerhalb der vorangegangenen 2 Monate angaben, stuften rund 45% diesen als schwer ein. In 48% wurde der Schmerz durch Kauen ausgelöst. 'Anwesenheit von Karies' wurde am häufigsten als Ursache für Zahnschmerz angegeben (67%). Insgesamt 74% der Kinder wurden durch die Schmerzen beeinträchtigt, während 66% der Eltern von Auswirkungen der Schmerzen auf das Kind berichteten. Ethnische Zugehörigkeit, Einkommen der Eltern sowie Karieserfahrung des Kindes waren signifikant mit der Angabe von Schmerzen während der zwei vorangegangenen Monate assoziiert.
Schlussfolgerungen. Die Prävalenz von Zahnschmerzen bei diesen Kindern war hoch, die Schmerzen hatten erhebliche Auswirkungen sowohl auf Kinder wie auch auf deren Eltern.

Resumen. *Objetivo*. El estudio se dirigió a determinar la prevalencia e impacto del dolor bucal en niños de 8 años y sus padres, en Sri Lanka.
Diseño. Un estudio transversal usando una técnica de muestreo de cluster multietapas se aplicó en 614 niños asistentes a escuelas en la División de Educación de Badulla. Los datos se recogieron mediante un cuestionario pre-test para cada uno de los niños y sus padres. A los niños se les realizó también un examen bucal. De los 614 cuestionarios que fueron enviados a los padres, 30 no fueron devueltos y 8 tuvieron que ser excluidos del análisis pues los encuestados respondieron sólo a dos preguntas. Por tanto el presente análisis está limitado a datos de 576 niños y sus padres.
Resultados. La prevalencia de tiempo medio de dolor bucal de acuerdo con los niños y los padres fue del 49% y 53% respectivamente. Según el informe de los niños, el 25% había experimentado dolor bucal en al menos 2 meses, mientras el 31% de los padres señaló que sus hijos habían experimentado dolor bucal durante el mismo periodo. De aquellos niños que señalaron que habían experimentado dolor bucal en los últimos 2 meses, casi el 45% indicó que el dolor era severo. En el 48% el dolor se había provocado al morder. 'La presencia de cavidad/diente cariado' fue citada como causa más común de dolor bucal (67%). El 74% del conjunto de niños había experimentado un impacto negativo debido al dolor mientras que el 66% de los padres dijo que el dolor del niño les había impactado. El grupo étnico, la renta familiar, el nivel de educación y la experiencia de caries del niño estaban asociados significativamente con la manifestación de dolor bucal en los últimos 2 meses.
Conclusiones. La prevalencia de dolor bucal fue alta entre los niños y tuvo un impacto considerable en los niños y sus padres.

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End note: – This study was carried out in an area of Sri Lanka away from the coast and which was not directly involved in the tsunami disaster of December 2004.

– Editor.

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