*Acta Odontologica Scandinavica*, 2008; 66: 7–12

informa
healthcare

**ORIGINAL ARTICLE**

# Impacts of dental pain on daily activities of adolescents aged 14–15 years and their families

PAULO S. A. GOES[1], RICHARD G. WATT[2], REBECCA HARDY[2] & AUBREY SHEIHAM[2]

[1]*Departamento de Odontologia Social, Faculdade de Odontologia de Pernambuco, Universidade de Pernambuco Recife-PE, Brazil and* [2]*Department of Epidemiology and Public Health, University College London, London, UK*

**Abstract**

***Objective.*** To assess the prevalence and severity of dental pain on the daily lives of adolescents and their families in Brazil, and, in terms of socio-economic status, whether there are differences in the prevalence of impacts. ***Material and Methods.*** In a cross-sectional survey of a random sample of 14 to 15-year-olds in Brazil, the prevalence and severity of dental pain, and how dental pain affects daily functioning, were assessed using a child-related questionnaire. A family-related questionnaire included questions on a child pain inventory and the pain-related impacts on the daily lives of the child's family members. ***Results.*** 14.5% of children reported high impact levels on their daily lives related to dental pain, the more so among girls than among boys, i.e. 16.7% compared to 11.6%. Significantly more impacts occurred in lower socio-economic class children than in higher, i.e. 19.7% versus 7.8%. The prevalence of impacts among children who reported dental pain ($n = 354$) was high; 64.7% reporting that concentration at school was affected, 55.6% that home activities were affected, and 51.4% that leisure activities were affected. There was a significant relationship between impacts of dental pain on children and families. Overall prevalence of impacts on children's families was 15.2%. The most frequent family dimensions affected were: in carrying out normal household activities (19.7%) and in visiting friends and relatives (17.7%). Emotional stability was the most frequent psychological activity dimension affected (14.1%); 9.6% of parents were woken up as a result of their child's dental pain on an average of 3.7 nights per week. ***Conclusions.*** Dental pain has considerable impact on the daily lives of adolescents and their families in Brazil. There are many more dental pain-related impacts in girls and in lower social class children.

**Key Words:** *Adolescents, dental, family, impacts, pain*

## Introduction

Dental diseases have social, psychological, and economic impacts and can adversely affect quality of life by impairing people's physical and social functions and self-esteem. Dental pain is frequently a cause of negative dentally related impacts on daily life. However, although common among children and adults world-wide [1], little research has been done on the impacts of dental pain on children. Miller et al. [2] drew attention to the fact that impacts of dental pain on people's daily lives were being neglected, and that in the United Kingdom about 5 million days of work were lost and 1 million nights of sleep disturbed per year due to dental pain. Locker & Grushka [3] reported associations in Canadian adults between dental pain and disturbed sleep and recommended avoidance of certain foods. In Malaysia, Jaafar et al. [4] found that 18% of Malaysian adults had disturbed sleep, and that 10% could not work because of dental pain. In a national study in the USA, Sternbach [5] estimated that dental pain accounted for USD 1.5 billion in lost productivity per year among people in full-time employment.

There have been only a few studies on the prevalence of impacts of pain in children. In two large international studies, Chen & Hunter [6] and Chen et al. [7] reported on differences in the rates of impacts of oral disease on children in different countries. Shepherd et al. [8] assessed the impact of dental pain on the activities of 8-year-old children in London and their families. Eating was the most frequent activity disrupted due to toothache, followed by stopping play and disturbed sleep. Among those who had dental pain, 11% did not go to school

Correspondence: Paulo Sávio Angeiras de Góes, Departamento de Odontologia Social, Faculdade de Odontologia de Pernambuco, Universidade de Pernambuco, Rua Esmeraldino Bandeira, 110 Graças, Recife-PE, Brazil. E-mail: psagoes@uol.com.br

*(Received 3 February 2007; accepted 15 November 2007)*

ISSN 0001-6357 print/ISSN 1502-3850 online 
DOI: 10.1080/00016350701810633

because of it. Slade et al. [9] reported that 32% of 7-year-old children in Australia experienced disturbed sleep resulting from toothache. Dental pain affected the performance of South African children [10] and Locker et al. [11] suggested that the orofacial conditions of a child affected the parents' daily activities as well as their emotions. Ratnayake & Ekanayake [12] reported that 74% of 8-year-olds who had suffered from dental pain in the previous 2 months had experienced a negative impact on daily life as a result of the pain, while 66% of the parents said that the child's pain had had an impact on them. Although not all the hours listed by Gift et al. [13] were due entirely to dental pain, they estimated that approximately 60 million school hours were lost by schoolchildren in the USA each year for dental reasons. Although not directly measuring toothache, some authors have shown that childhood caries and related toothache affect the oral health-related quality of life of children [14–16]. It is apparent that the impact of dental pain on children's quality of life remains under-researched.

Dental pain is used frequently as a quality of life measure [17,18] and most oral health-related quality of life measures include pain or discomfort among their dimensions. Self-reported pain and discomfort and the associated physical and psychological symptoms and other feeling states are sometimes used as proxy measures of disease and sometimes as measures in their own right [19,20].

As dental pain is so common and affects important aspects of daily life, e.g. schoolwork, sleep, and social activities, it is important to assess just how common and serious such impacts on daily living are among children. Since dental caries prevalence, the main cause of toothache, varies by socio-economic status, and there is a social class gradient in levels of restorative treatment, we hypothesized that there would be differences in levels of impact by social status. The objective of this study was to assess the prevalence and severity of impacts related to dental pain on the daily lives of adolescents and their families, and to assess whether there were differences in the prevalence of impacts by socio-economic status.

## Material and methods

The minimum sample size required to test the hypothesis was calculated to be 964 children. This assumed the prevalence of dental pain to be 30% in the previous 6 months and had 80% power. The study population was over-sampled by 20% to ensure at least the minimum required sample size. The final number of children invited to participate in the study was therefore 1200. A proportional two-stage stratified random sampling procedure was adopted. The first units were all secondary schools in the city of Recife, Brazil, while the second stage units were 14 to 15-year-old adolescents of both sexes from different social backgrounds. The number of adolescents selected from each school was proportional to the number of adolescents in the age required for the study in each school. Using the above-mentioned method, 30 of the 62 secondary schools in Recife were randomly selected. From those schools, 1200 students out of 20,307 secondary schoolchildren were randomly selected from the enrollment lists provided by each school. Of the 1200 children invited to take part in the main study, positive consent from the parents was obtained for 1112 (92.6%) and 1052 (87.6%) completed the two phases of data collection; of those, 710 (68%) families returned the family-related dental pain impact questionnaire.

The non-clinical data were collected through self-completed questionnaire and structured interview. Clinical dental examinations were carried out at the schools. Dental pain was characterized as pain emanating from the teeth and supporting structures as a result of disease or injury to the teeth [21]. The prevalence and severity of dental pain in the previous 6 months were recorded. Pain assessment was in accordance with the Pain Context Model [22], by which dental pain is assessed as pain intensity, pain affect, and pain location. The methods of assessing pain have been described elsewhere [1].

Two self-completed questionnaires were used – one for schoolchildren and one for the family. The child-related questionnaire assessed the prevalence and severity of dental pain, and how pain interfered with daily functions such as schoolwork, sleep, and social and physical activities. The family-related questionnaire sent to parents included a child pain inventory and questions on what impacts the child's pain had on the family's daily life.

To assess the prevalence of impacts, a questionnaire on how dental pain affected the daily functions of adolescents was developed based on McGrath's pain inventory [23,24]. The measure was translated into Portuguese and cross-culturally adapted. The children were asked to answer 'yes' or 'no' to questions covering 9 dimensions of their daily lives affected by dental pain. In the pilot study on 102 adolescents, the aggregate count of dimensions was used to construct a scale, which showed that the adolescents reported a mean of 3.6 (95% CI 3.3–3.9) dimensions and a median of 3.0 dimensions affected. On the basis of this median, the outcome used in this study was the cut-off of three dimensions affected. A high level of impacts was defined as being above the median; namely, more than three impacts. Reliability of the scale was assessed by inter-item correlation and alpha if an item was deleted. The test–retest of McGrath's pain inventory was significant ($r = 0.58$, $p < 0.001$).

Assessment of the prevalence and severity of impacts of the child's dental pain on the family was

based on the West Haven–Yale Multidimensional Pain Inventory (WHYMPI) [25] – a multifactor instrument designed to assess the broad domain of psychosocial variables relevant to the pain experience. The questions used were from the third part of the WHYMPI describing four categories of daily life: household activities, outdoor work, activities away from home, and social activities. The child's carer was asked to answer 'yes' or 'no' to each of 11 dimensions of their daily life. In the pilot study, an aggregate count of dimensions was used to construct a scale, which showed that the families reported a mean of 5.5 (95% CI 5.1–6.0) of 6 dimensions impacted. Other non-clinical data included information on the socio-economic and psychosocial characteristics of the adolescents and their families and on their oral health behaviors. Social class of the family is defined here as participation of the head of the family in the production or distribution processes, and his/her level of education. Within this classification system, six social classes were distinguished: Within the classification system used in the present study, the following socio-economic groups were distinguished: Bourgeois, traditional petit bourgeois, new petit bourgeois, typical proletariat, non-typical proletariat, and sub-proletariat. For the purpose of statistical analysis, these were reduced to two categories: high social class (bourgeois) and low social class (proletariat) [26].

*Validity and reliability of the data*

The dental research instruments used in the present study were translated into Portuguese and their cross-cultural validity was assessed in pilot studies. To assess the reliability of the questionnaire and clinical data, every tenth subject was re-examined ($n = 102$) during the main study. The test–retest reliability of prevalence of dental pain reported in the previous 6 months was assessed using Cohen's kappa and showed a significant correlation. Reliability of the impact scales was assessed by inter-item correlation and alpha if an item was deleted. Cronbach's alpha for this measure was 0.79 and the standardized alpha, where all item variance was standardized, was 0.79.

*Data analysis*

The data were analyzed using SPSS's Statistical Package for Social Science software (v. 10.0, Chicago, Ill., USA). Prevalence of impacts of dental pain was calculated among the total sample of adolescents and among the sample of adolescents with toothache. Mean scores were calculated for the impact scale. Chi-squared tests and logistic regression were used to test the association between socio-economic status and the impact of dental pain on daily activities of the schoolchildren and their families. A 5% level of significance was taken as the reference for all analyses.

*Ethical approval*

The study was granted the ethical approval of a research ethics committee and the parents' consent was received for participation of their child in the study.

## Results

*Prevalence of impacts of dental pain on the adolescents*

The prevalence of impacts related to dental pain in all adolescents is given in Table I. Nine dimensions of their daily activities were assessed and grouped within three main categories: school activities, social activities, and physical activities. As mentioned above, a high level of impacts was defined as more than three (Table I). The most frequent individual impacts were on concentration at school, followed by home activities, leisure activities, sports activities, playing with friends, reading capacity, school homework, and school attendance (Table I). The adolescents reported that their concentration at school and during home and leisure activities was affected (Table I).

More girls than boys in the total sample had a high level of impacts ($p < 0.02$), and there were

Table I. Prevalence of impacts (%) of toothache in the past 6 months in 14 to 15-year-old Brazilian schoolchildren ($n = 1052$)

| Daily life activities affected (McGrath Pain Inventory) | *n* | Prevalence of impacts in the total sample (%) (95% CI) | Prevalence of impacts in the toothache sub-sample (%) $n = 354$ (95% CI) |
|---|---|---|---|
| School attendance | 91 | 8.6 (6.9–10.2) | 25.7 (25.65–25.75) |
| Reading capacity | 106 | 10.1 (8.3–11.9) | 29.9 (29.88–29.92) |
| School work | 104 | 9.8 (8.0–11.6) | 29.4 (29.83–29.97) |
| Concentration at school | 229 | 21.7 (19.2–24.2) | 64.7 (64.67–64.73) |
| Social activities | 138 | 13.1 (11.1–15.1) | 39.0 (38.97–39.03) |
| Leisure activities | 182 | 17.3 (15.0–19.6) | 51.4 (51.38–51.42) |
| Watching TV | 76 | 7.2 (5.6–8.8) | 21.5 (21.48–21.52) |
| Sports practice | 157 | 14.9 (12.7–17.1) | 44.4 (43.97–44.43) |
| Home activities | 197 | 18.7 (16.3–21.0) | 55.6 (55.57–55.63) |
| Overall impacts* | | 14.5 (12.2–16.8) | |

*The percentage of children with more than three dimensions affected.

significantly more high levels of impacts in lower than in higher social class adolescents ($p < 0.0001$) (Table II). The severity of toothache affected the prevalence of impacts. Among the total sample, adolescents with severe toothache reported high levels of impacts compared to those with less severe toothache (OR = 6.5, 3.8–11.4, 95% CI). Adolescents with toothache for more than 2 days had high levels of impacts compared to those with toothache of shorter duration than 2 days (OR = 3.2, 1.9–5.3, 95% CI).

*Prevalence of impacts of dental pain on the families*

There was a highly significant relationship between the impacts of dental pain in the adolescents, on the one hand, and the impacts on their families, on the other. The odds of a family being affected if their child had a pre-defined high score on the McGrath Child Pain Inventory was 4.7 (95% CI = 3.0–7.5; $p < 0.001$) compared to those with a child with little or no level of impact.

The impact of dental pain on the adolescents' families was assessed across 11 dimensions of daily life. As indicated in Table III, the dimensions were divided into four categories: physical activities, social activities, psychological aspects and economic aspects. The most frequently reported dimensions affected were physical and social activities, i.e. carrying out usual household activities and going out to visit friends and relatives. Those activities also had the highest mean severity scores of any of the impacts. Emotional stability was the most frequent psychological activity dimension affected. Almost 1 in 10 parents was woken up as a result of their child's dental pain. Even family relationships, such as that between the affected child and its siblings and parents, were affected (Table III).

Parents reported impacts on work loss because of their child's dental pain. In addition, dental pain affected the family budget. Money spent on relieving their child of the dental pain had a considerable effect on the family's budget (Table III).

*Relationship between social class and impacts on families of adolescents' dental pain in the previous 6 months*

There was a significantly higher prevalence of overall impacts of dental pain on families of lower social class adolescents than higher ($p < 0.002$). Families from low socio-economic backgrounds had odds 1.6 times (CI = 1.0–2.6; $p = 0.038$) greater of reporting an impact from dental pain than were high social class families, after adjusting for the sex of the child and impact of dental pain on their child. The strongest predictor of impact on the family was that of dental pain on the child after adjusting for sex of the child and the impact of dental pain on the child.

## Discussion

The overall prevalence of impacts of pain associated with dental pain on the daily activities of adolescents in this study, although considerable, was less than in South Africa and Sri Lanka [10,12]. This may be related to Brazilian adolescents' relatively low level of caries compared to other populations. Among adults, the commonest impacts of dental pain were sleep disturbance, loss of work, and avoidance of certain foods, whereas in Brazilian adolescents concentration in school and interference in sports and home activities were the main impacts. Similar findings to those in the Brazilian adolescents have been reported in Sri Lankan children. In Sri Lanka, difficulty eating (58%), being prevented from playing (40%) and from attending school (22%) were common impacts related to dental pain. Our findings on impacts for dental pain were similar to those

Table II. Relationship between the impacts of toothache and socio-demographic variables andcharacteristics of toothache ($n = 1052$)

| Variables | Impacts of toothache | | Total *n* (column %) | $\chi^2$ *p*-value |
|---|---|---|---|---|
| | None/low (*n* /row %) | High (*n* /row %) | | |
| Socio-demographic | | | | |
| Sex | | | | |
| Male | 396 (88.4) | 52 (11.6) | 448 (42.6) | $\chi^2 = 5.41$ |
| Female | 503 (83.3) | 101 (16.7) | 604 (57.4) | $p = 0.02$ |
| Social class | | | | |
| High | 423 (92.2) | 36 (7.8) | 593 (56.4) | $\chi^2 = 29.4$ |
| Low | 476 (80.3) | 117 (19.7) | 459 (43.6) | $p < 0.001$ |
| Characteristics of toothache | | | | |
| Severe toothache | | | | |
| No | 864 (90.0) | 96 (10.0) | 960 (91.3) | $\chi^2 = 182$ |
| Yes | 35 (38.0) | 57 (62.0) | 92 (8.7) | $p < 0.001$ |
| Duration of toothache for more than 2 days | | | | |
| No | 832 (90.0) | 92 (10.0) | 924 (87.8) | $\chi^2 = 128$ |
| Yes | 67 (52.3) | 61 (47.7) | 128 (12.2) | $p < 0.001$ |

Table III. Prevalence of impacts (%) of schoolchildren's toothache in the last 6 months on the families ($n = 710$)

| Daily life activities | *n* | Prevalence of high level of impacts on families (95% CI) | Prevalence of high level of impacts in toothache subsample (95% CI) | Mean severity score (95% CI) |
|---|---|---|---|---|
| Physical activities | | | | |
| Usual household activities | 140 | 19.7 (22.6–16.8) | 74.0 (66.2–81.8) | 2.6 (2.2–2.9)[1] |
| Take a trip | 97 | 13.7% (11.2–16.2) | 51.0 (50.1–60.9) | 1.4 (1.1–1.7)[1] |
| Social activities | | | | |
| Go out to parties or church | 92 | 13.0 (13.5–18.9) | 48.6 (38.4–58.8) | 2.0 (1.7–2.3) [1] |
| Go out to cinema and theatre | 92 | 13.0 (13.5–18.9) | 48.6 (38.4–58.8) | 1.0 (0.8–1.3) [1] |
| Go out to visit friends or relatives | 126 | 17.7 (14.9–20.5) | 66.6 (58.4–74.8) | 2.2 (1.8–2.6) [1] |
| Go out to the beach | 115 | 16.2 (13.5–18.9) | 60.8 (51.9–69.7) | 1.8 (1.5–2.1) [1] |
| Psychological activities | | | | |
| Wake up during the night | 101 | 9.6 (7.4–11.8) | 53.4 (43.7–63.1) | 3.7 (3.2–4.2)[2] |
| Emotional stability | 100 | 14.1 (11.5–16.7) | 52.9 (43.2–62.6) | – |
| Family relationship | 46 | 4.6 (3.1–6.1) | 24.3 (12.6–36.6) | – |
| Economic impacts | | | | |
| Loss of work days | 44 | 6.2 (4.4–8.0) | 23.2 (10.9–35.5) | 1.4 (1.0–1.7)[3] |
| Expenditure on pain relief | 66 | 9.3 (7.2–11.4) | 34.9 (23.5–46.3) | – |
| Overall impacts | | 15.2 (12.6–17.8) | – | – |

[1]Original severity scale from WHYMPI (West Haven–Yale Pain Inventory; range 0–5).
[2]Number of nights parents kept awake by child.
[3]Number of days of work lost.

reported for back pain, dysmenorrheal and headache in schoolchildren [27,28].

The impacts of pain on the daily activities of the child and their families were associated with socio-economic position of the parents. Compared to children from a high socio-economic background, children from a low socio-economic background were more often affected; they had more severe impacts of longer duration and their families were disrupted more by the dental pain. One explanation for the association between socio-economic status and dental impact is that those from low socio-economic backgrounds have more dental decay, untreated dental decay, poorer patterns of dental attendance, and a higher prevalence of dental pain [1]. As there was a relationship between dental impacts and severity of dental pain, other psycho-social factors related to dental disease and dental pain could explain the differences in levels of impacts by social class.

Severity of dental pain was the main predictor of pain impacts on the daily lives of the children, which is a finding similar to that reported by Locker & Grushka in adults in Sri Lankan children [3,12]. Ratnayake & Ekanayake [12] found that difficulties in eating and disturbed sleep were significantly associated with degree of pain. This finding supports the view that disability experienced by children varies with severity of the pain condition [12,28].

Whereas there are studies indicating that parents and child report the intensity of pain differently [29], in this study, where we analyzed impacts of pain reported by the adolescent and their parents separately, there was a good association between what the child said about the impacts of oral pain on his/her life, and what the parents said about the effects of the child's pain on the family.

In conclusion, dental pain has considerable impacts on the daily lives of Brazilian adolescents and their families. Its severity is the main predictor of pain impacts on the daily lives of adolescents. There are many more dental pain-related impacts in girls and among lower social class adolescents. Since many aspects of the adolescents' daily lives, particularly their school work and play, are affected by dental impacts, dental programs should include measures of dental impacts when screening children to assess who needs dental treatment.

## Acknowledgment

The study was funded by CAPES.

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