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Family structure is associated with oral pain in 12-year-old Greek schoolchildren

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Objective. To determine the prevalence, associated correlates and impact of oral pain in 12-year-old schoolchildren in Stayroypoli, Greece.

Design and method. Cross-sectional survey of all schoolchildren attending the last year of government primary schools using self-administered questionnaires. Approval was granted by the Greek Ministry of Education and Religion. Cooperation was obtained from the schools. Children whose parents did not refuse their participation were invited to complete a questionnaire. Oral pain prevalence was estimated and association with sociodemographic/economic factors tested. Associations between pain experience and impact on daily activities were examined.

Results. Of the 296 children registered, 225 (76.0%) were present on the days data were collected. Usable questionnaires were completed by 187 children (83.1%). Oral pain in the previous 4 weeks, reported by 70 (37.4%), was more likely to affect children living with one parent/other people (OR 3.0, 95% CI = 1.2–7.4, $P = 0.013$) and those who brushed less than twice a day (OR 2.8, 1.5–5.2, $P = 0.001$). Impact on daily activities was reported by 64 children (91.4%). The most commonly stated impacts were eating (40.0%), cleaning teeth (25.7%) and sleeping (18.6%).

Conclusions. Oral pain prevalence was high in 12-year-old schoolchildren in Stayroypoli, is associated with family structure, and impacts substantially on daily activities.

Introduction

Pain among children and adolescents has been identified as an important public health problem[1,2], with prevalence estimates reported to range from 9% for chest pain to 12% for tooth pain and 60% for headache[3]. Oral pain, defined as pain within the mouth[4], has also been increasingly highlighted as a public health problem. In the UK, 48% of 8-year-old schoolchildren in Harrow, England, reported having experienced oral pain, 8% of whom had experienced it in the previous 4 weeks[5]. In Sri Lanka, lifetime prevalence of oral pain for 8-year-olds has been reported to be 49%, with 25% reporting oral pain during the past 2 months[6]. Prevalence estimates for oral pain have been reported to be 88% for 8- to 10-year-old South African schoolchildren in the Western Cape[7], 34% for 12- and 13-year-old Brazilian schoolchildren in Florianopolis[8], 25% for 11- and 12-year-old Thai schoolchildren in Suphanburi[9] and 12% for American school-age children in Maryland[10].

Not only is the prevalence of oral pain high, but its severity and impact on daily functioning has been reported to be substantial. For example, a recent survey of Thai primary schoolchildren reported that 'toothache' was one of the more common causes of impact on daily functioning such as eating and smiling[9]. There is also evidence to suggest that dental pain reported by children can be so severe as to make them cry or disturb their sleep[6], resulting in some children missing school[7] and making visits to the dentist[5].

Correlation between the caries experience and prevalence of oral pain has been reported to be moderate to strong[10,11]. Since oral pain is a common consequence of untreated dental caries, predisposed by poor oral hygiene and a high sugar diet, it is likely that the family context in which these behaviours are practised will have an impact on oral pain. The relationship between family structure and aspects of health in adolescence has been well

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documented[12–15]. Recent research on the life course approach to explain variations in experiences of oral health has reported associations between family structure and oral conditions in adolescents[16–18]. Data on caries are regularly collected, especially in developed countries, but data on oral pain are somewhat lacking. Furthermore, there has not been any research investigating the relationship between family structure and oral pain.

Greece has one of the highest DMFT scores compared to some of its neighbouring countries in Western Europe[19], but there are no data on the oral pain experience in Greek children. Knowledge about the scope that oral pain poses as a public health problem can be used to plan preventive and treatment efforts. The aim of this paper is to report the 4-week oral pain prevalence for 12-year-old Greek schoolchildren resident in the municipal area of Stayroypolis, Thessaloniki, and to identify its associated factors and impact on daily activities.

Methodology and subjects

The present cross-sectional survey was carried out in April 2006 in Stayroypoli, one of 43 municipal areas in Thessaloniki, Greece. Thessaloniki is the second largest urban area of Greece, with municipalities to the west increasingly becoming home to new immigrants and are predominantly working-class areas, whereas the newly emerging suburbs to the east are where the vast majority of the middle-income residents are moving to. Many of these suburbs are seeing rapid growth and development, and infrastructure is not keeping pace. Stayroypoli, with a population of 41 653, is one of the largest and most densely populated districts in the western part of Thessaloniki.

The study population consisted of all children attending the final year class of public/government primary schools, most of whom would be aged 12 years. There are 14 primary schools in Stayropoli.

An application for approval to carry out the study was lodged with the Department of Research, Evidence and Education Technology at the Greek Ministry of Education and Religion, who advised that questionnaire surveys on children were permitted as long as the teachers or administrators of the schools did not object. The education administrator of Stayroypoli was approached and the study explained. Although approval was obtained and all 14 primary schools agreed to collaborate, the researcher was not permitted to enter the schools to carry out data collection. Consequently self-administered questionnaires with instructions, together with an information leaflet explaining the study and seeking consent were distributed to the teachers through the education administrator. The researcher explained the study and data collection procedure to the administrator, who in turn conveyed the information to the teachers. The researcher's name (K.G.B.) and telephone number were printed on the information leaflet and parents were invited to get in touch if they had any queries related to the study. The questionnaires and information leaflets were circulated to the children who took them home for their parents' scrutiny. Those children whose parents did not object to the study by refusing their children to participate were invited to complete the questionnaires under the teachers' supervision. Completed questionnaires were returned to the researcher by the education administrator.

Questions on the experience of pain and its impact of daily activities such as play, sleep and eating were adapted from the questionnaire used by Shepherd *et al.*[5], which had also been adapted for use by Naidoo *et al.*[7] in South Africa. The children were also asked for their age and sex, and whether they lived with both or one of their parents, and whether both or one was in employment. The data obtained were entered into SPSS version 13 and analysed. Frequency distributions for sociodemographic/economic characteristics were presented, and their associations with oral pain were explored using the χ^2-test for comparing proportions. Logistic regression analysis was carried out to identify independent significant predictors for oral pain. The odds ratio and 95% confidence interval for predictors being associated with oral pain was calculated. For those reporting oral pain, frequency distributions for descriptions of the pain experience and its impacts on daily activities were presented. The oral pain sample was divided into

one group who reported zero or one impact, and another who reported two or more impacts. Associations between pain descriptions and impact on daily activities were examined using the χ^2-test.

Results

Of the 296 children registered in the final year classes in all public/government primary schools in Stayroypoli, 225 (76.0%) were present on the day the questionnaires were distributed. Fully usable questionnaires were returned by 187 (83.1%) children, amongst whom 91 (48.7%) were boys, 115 (61.5%) were aged 10–12 years and the rest 13–14 years, 164 (87.7%) lived with both parents, 113 (60.4%) reported that both their parents worked, and 102 (54.5%) brushed their teeth twice or more a day while the rest brushed once a day or did not brush everyday.

Oral pain in the previous 4 weeks was reported by 70 children (37.4%, 95% CI = 30.5–44.8). The proportion of 13–14 years old children reporting oral pain was significantly higher compared to 10–12 years old children (OR 2.9, 95% CI = 1.6–5.4, $P = 0.001$). Compared to children living with both parents, those living with one parent or other people (such as grandparents) were more likely to report oral pain (OR 3.0, 95% CI = 1.2–7.4, $P = 0.013$). Children who brushed once a day or not at all were also more likely to report oral pain compared to those who brushed at least twice a day (OR 2.8, 95% CI = 1.5–5.2, $P = 0.001$). Results of logistic regression analysis suggested that older children (OR 2.8, 95% CI = 1.5–5.4, *P*-value = 0.002), those not living with both parents (OR 2.7, 95% CI = 1.0–7.0, *P*-value = 0.041) and those who brushed once a day or not at all (OR 2.7, 95% CI = 1.4–5.2, *P*-value = 0.002) were independent significant predictors for oral pain (Table 1).

Of the 70 children who reported oral pain, 42 (60.0%) described their pain as coming from a tooth compared to 28 (40.0%) from the gums or elsewhere (Table 2). Over half the sample (51.4%) reported moderate to a lot of pain. A similar proportion (57.1%) reported that the worst pain they had experienced in the previous 4 weeks had lasted more than an hour. The most commonly reported provoking factor was cold (50.0%), followed by biting (37.1%), sweet (28.6%) and hot (24.3%). Twenty-two (31.4%) children reported that the reason for their pain was a hole in a tooth, whereas 14 (20.0%) reported that the pain was due to a tooth injury.

Table 1. Sample description, with distributions for oral pain, and results of logistic regression analysis showing unadjusted and adjusted odds ratios with 95% confidence intervals for socio-demographic-economic and toothbrushing characteristics associated with oral pain (*n* = 187).

		Oral pain in the previous 4 weeks (*n* = 187)					
	Sample *n* (%)	Yes *n* (%)	No *n* (%)	Unadjusted OR (95% CI)	*P*-value	Adjusted OR (95% CI)	*P*-value
Sex							
Boys	91 (48.7)	33 (36.3)	58 (63.7)	0.9 (0.5–1.6)	0.748		
Girls	96 (51.3)	37 (38.5)	59 (61.5)	1			
Age							
13–14 years	72 (38.5)	38 (52.8)	34 (47.2)	2.9 (1.6–5.4)	0.001	2.8 (1.5–5.4)	0.002
10–12 years	115 (61.5)	32 (27.8)	83 (72.2)	1			
Family structure							
Living with one parent/others	23 (12.3)	14 (60.9)	9 (39.1)	3.0 (1.2–7.4)	0.013	2.7 (1.0–7.0)	0.041
Living with both parents	164 (87.7)	56 (34.1)	108 (65.9)	1			
Family employment status							
One parent work/others	74 (39.6)	34 (45.9)	40 (54.1)	1.8 (1.0–3.3)	0.052		
Both parents work	113 (60.4)	36 (31.9)	77 (68.1)	1			
Toothbrushing							
Once or less a day	85 (45.5)	43 (50.6)	42 (49.4)	2.8 (1.5–5.2)	0.001	2.7 (1.4–5.2)	0.002
Twice or more a day	102 (54.5)	27 (26.5)	75 (73.5)	1			
Total	187 (100.0)	70 (37.4)	117 (62.6)				

Table 2. Self-reported description of oral pain experienced in the previous 4 weeks by the sample (*n* = 70).

	n	%
Site of pain		
Pain from tooth	42	60.0
Pain from gums/elsewhere	28	40.0
Intensity		
A little pain	34	48.6
Moderate to a lot of pain	36	51.4
Duration of worst pain experienced		
A few minutes	30	42.9
More than an hour	40	57.1
Provoking factors (multiple responses)		
Pain worse with		
Sweets	20	28.6
Cold	35	50.0
Hot	17	24.3
Biting	26	37.1
Reason for pain		
Hole in tooth	22	31.4
Gum boil	2	2.9
Tooth injury	14	20.0
Others	32	45.7

Table 3. Distributions of impact on daily activities associated with experience of oral pain in the previous 4 weeks (multiple responses were recorded).

	n	%
No impact	6	8.6
One impact	39	55.7
Two or more impacts	25	35.7
Eating	28	40.0
Cleaning the mouth	18	25.7
Sleeping	13	18.6
Speaking and pronouncing clearly	9	12.9
Showing teeth	7	10.0
Laughing	6	8.6
Playing	5	7.1
Going to school	4	5.7
Smiling	4	5.7

Impact on daily activities were reported by 64 (91.4%) of the children, with 39 (55.7%) experiencing one impact and 25 (35.7%) at least two impacts (Table 3). The most commonly stated impact was on eating, reported by 28 (40.0%) children, followed by cleaning teeth (25.7%), sleeping (18.6%), and speaking and pronouncing clearly (12.9%).

The association between pain characteristics and impact on daily activities are presented in Table 4. A statistically significant higher proportion of children reporting moderate to a lot of pain experienced at least two impacts compared to those reporting a little pain (OR = 2.9, 95% CI = 1.0–8.1, $P = 0.039$). The number of impacts was also associated with the duration of the worst pain experienced, with those reporting worst pain lasting more than an hour significantly more likely to experience at least two impacts (OR = 3.6, 95% CI = 1.2–10.7, $P = 0.017$).

Discussion

The aim of the present study was to estimate the prevalence of oral pain in 12-year-old Greek schoolchildren resident in Stayroypoli, Thessaloniki, to describe its impact on daily activities, and to explore its association with family life. The main findings are that over one-third of the children sampled reported oral pain and those living with one parent or other people such as grandparents were three times more likely to report oral pain compared to those from intact families, i.e. those living with both parents. Of those reporting oral pain, over 90% had experienced at least one

Table 4. Association between oral pain experienced in the previous 4 weeks and number of impacts reported.

	One or no impact	Two or more impacts	Odds ratio (95% CI)	*P*-value
Site of pain				
Pain from tooth	28 (66.7)	14 (33.3)		
Pain from gums/elsewhere	17 (60.7)	11 (39.3)		
Intensity				
A little pain	26 (76.5)	8 (23.5)	1	
Moderate to a lot of pain	19 (52.8)	17 (47.2)	2.9 (1.0–8.1)	0.039
Duration of worst pain experienced				
A few minutes	24 (80.0)	6 (20.0)	1	
More than an hour	21 (52.5)	19 (47.5)	3.6 (1.2–10.7)	0.017

impact on their daily activities, suggesting that oral pain is a significant public health concern.

The proportion of Greek schoolchildren in this sample reporting oral pain in the past 4 weeks was substantial compared to estimates reported in the literature[5,6,8–10]. However, comparison with other studies may be inappropriate because of the timescale used for estimating prevalence and the age of the children sampled. For example, some studies reported lifetime prevalence,[10] while others reported prevalence for the past 2 months[6,7] or the past 4 weeks[5]. The collection of self-reported health data necessarily depends on the recall ability of the respondents, which is a function, among other things, of the subjects' age as well as time interval between the occurrence and recall of the event[20]. The 4-week timescale used in the present study was short compared to previous studies, ensuring more accurate prevalence estimation. A prevalence of 37%, when extrapolated to a population of 1.1 million in Thessaloniki would mean that in the previous 4 weeks a considerable proportion of schoolchildren would have experienced oral pain, with significant consequences for the oral health system. Future research is needed to identify the reasons or causes for this oral pain and develop strategies to prevent and manage this public health problem.

A key finding of the present survey is that children who lived with both parents were less likely to report oral pain compared to those who lived with one parent, grandparents or others. In this sample of Greek children, oral pain was statistically more strongly associated with family structure than with family socioeconomic status (as measured by parents' employment status). Family structure has been proposed to impact on the acquisition of biological resources during the early stages of child development, which in turn determines the current and future health potential of children, including resilience to challenges[21]. For example, family life during early childhood is associated with deciduous caries in 5-year old children[22], and at the same time has an impact on biological growth, such as height of the child, which in turn is associated with experience of caries in adolescence[23]. Adolescents who live with both parents have previously been documented to be less likely to experience gingivitis[16] and traumatic dental injuries[17]. The finding that family structure is associated with oral pain has not been previously reported. This finding contributes further evidence to support the argument for the association between family structure and child health[13,15], with implications for strategies to prevent oral pain in children and its future impact on their oral health. Disparity in the oral pain experience in relation to family structure may find its explanation in the psychosocial framework. This postulates that social factors in childhood influence the processes of biological development, and are the beginnings of socially determined pathways to health and disease[24]. Thus, it would seem reasonable to assume that an adverse family and socioeconomic environment, such as parental divorce that results in children living with one parent or other people, would tend to reduce the chances of developing supportive individual social resources, which in turn may lead to the adoption of health-damaging behaviours such as inappropriate sugar consumption and infrequent toothbrushing, and consequently experience of oral pain.

Prevention of oral pain in children needs to consider, for example, the family context in which sugar consumption is not controlled. Efforts to promote dental attendance for treatment of carious lesions before progression to oral pain should take into account the family circumstances in which such care-seeking behaviours are practised. However, the explanatory pathways cannot be confirmed in studies using the cross-sectional design. Future research using large samples and the prospective study design is needed to explore how family structure can impact on oral health behaviours such as sugar consumption and use of dental services.

The impact on daily activities reported by Greek children was substantial. Of the children reporting oral pain, over 90% experienced some form of impact on their daily activities, the most common being eating, cleaning the mouth and sleeping. Pain in general has been reported to impact on children's daily activities[3], and oral pain such as toothache in particular has been reported to affect children's daily performances[5,6,9], especially impact on eating. Those who complained of moderate to a lot of

pain, and pain lasting more than 1 hour, were more likely to report two or more impacts. This is consistent with reports that pain intensity is the most robust variable for predicting functional impairment of daily life[3]. Research so far suggests that oral pain has substantial impact on children's daily activities. However, the literature is scarce and further research is needed to explore the relationship between oral pain and impact on daily activities.

Findings from the present study should be considered in relation to some methodological limitations. First, since the sample was drawn from a relatively small geographical area, generalizability of the results to all Greek 12-year-old children or even to those in Thessaloniki should be made with caution. Second, the questionnaire used had not been piloted or tested in a Greek population, although it had been adapted from questionnaires used in different sociocultural settings. However, the results obtained in the present study, which may be considered a pilot study, suggest that the questionnaire may be reliably used in future studies of similar populations. Third, a significant proportion of the children were not present at school on the day that the questionnaires were administered. Although 83% of those present completed the questionnaire fully, the findings reported pertained to 63% of all the 12-year-old schoolchildren in Stayroypoli. Since the researcher was not allowed to enter the schools to collect data, and to avoid further disruption to classroom activities, no further attempts were made to pursue those children who were not present. Future research could consider the possibility of the children completing the questionnaires at home and stamped addressed envelopes provided for their return.

Findings from the present study suggest that oral pain in Stayroypoli is a public health problem affecting a substantial proportion of the population and measures are needed to manage it so as to minimize its impact on daily activities. They also support the proposition for the association between family structure and oral pain. Future research is needed to establish the reasons for the oral pain experienced and to identify strategies for its management. Another direction for future research is to explore the dynamics of family structure that impact on the practice of health behaviours associated with oral pain.

What this paper adds
- Oral pain affects a substantial proportion of Greek 12-year-olds.
- Oral pain is associated with family structure.
- Oral pain has significant impact on daily activities.

Why this paper is important to paediatric dentists
- Prevention and treatment of oral pain should take into account the family context in which health behaviours in relation to oral pain are practised.

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