

Dental pain experience and impact on children in Tabuk, Saudi Arabia

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تهدف هذه الدراسة إلى تقييم نسبة المصابين بالآلام الأسنان بين طلاب الصف الثالث الابتدائي السعوديين خلال الأربع أسابيع السابقة للبحث و تأثير تلك الآلام على الأطفال وأسرتهم. و من بين ثلثمائة وتسعة أطفال تم اختيارهم بطريقة عشوائية لسؤالهم عن آلام الأسنان تم استكمال الاستبيان فقط من قبل هؤلاء الذين أعلنوا عن شعورهم بالآلام الأسنان خلال الشهر الماضي وذلك للتعرف على شدة الألم ومدته وتأثيره، كما تم فحصهم لتحديد سبب الألم. كما استخدمت وسائل إحصائية لتحديد العلاقة بين العوامل المختلفة الموجودة في الاستبيان و جنس الطفل (ذكر أو أنثى). و قد أعلن حوالي 67% من المجموعة المختارة كلها أنهم عانوا من الآلام الأسنان في السابق كما أعلن 40% عن شعورهم بالآلام الأسنان خلال الشهر السابق للمقابلة. و وجد أن الآلام ترجع لسبب مرضي في 82% من هؤلاء الذين أعلنوا عن شعورهم بها خلال الشهر الماضي. و قد منعت الآلام الأسنان 60% من الأطفال من الأكل، 42% من اللعب، 43% من النوم، 27% من الذهاب إلى المدرسة. كما اضطرت 15.6% من الآباء لترك أعمالهم لاصطحاب الأطفال إلى طبيب الأسنان. و قد أعلن 17.2% من الأطفال أنهم قد زاروا طبيب الأسنان بسبب تلك المشكلة بينما أعلن 17.2% أنهم لم يزوروا طبيب أسنان أبداً خلال حياتهم. و قد أوضحت نتائج هذه الدراسة وجود نسبة عالية من الأطفال الذين يعانون من آلام الأسنان و ذلك مقارنة بما جاء في دراسات مشابهة. و من الواضح أن آلام الأسنان لها تأثير سلبي على الأطفال كما تؤثر على أسرهم و على المجتمع ككل.

This study assessed dental pain experience during four weeks previous to the study, its aetiology and impact on grade 3 Saudi Elementary school children and their families. Three hundred and nine students were randomly selected and asked about their dental pain experience. Those who reported having pain during these four weeks, completed an interview questionnaire related to the severity, duration and impact of pain, and were clinically examined to determine the cause. Chi-square and the Odds ratio tests were used to assess relationship between the two genders and the different variables included in the questionnaire. Approximately 67% of the total sample reported a previous history of dental pain, and 40% had pain within the last month prior to the interview. Among those reporting dental pain within the last month 82% of the pain was due to pathological reasons. Dental pain prevented approximately 60%, 42%, 43% and 27% of the students, respectively, from eating, playing, sleeping and going to school. Also, 15.6% of guardians had to leave their work place to take children to the dentist. Only 43.3% reported seeing a dentist for this dental problem, while 17.2% said they had never visited a dental clinic. The results of the study indicated a very high prevalence of dental pain compared to that reported in other studies. Dental pain clearly affected the quality of the children's lives and had an impact on families and the society as a whole.

Introduction

For several years, the North West Armed Forces Hospitals Program (NWAFFHP) in Saudi Arabia has encountered a high demand for paediatric dental services in the face of an acute shortage of dentists to provide much needed dental care for young children. Consequently a high proportion of paediatric dental services has essentially been in the form of emergency care.

A study on caries experience in the primary dentition of Grade 1 Elementary school children (Mean age = 6.02 ±0.36 years) attending King Abdul-aziz Military City (KAAMC) schools in Tabuk revealed a very high value for dmft index (7.77) and untreated decay component (83%).¹ Therefore, if caries has progressed during the interim period, a high prevalence of dental pain might be expected in this group of children now in Grade 3.

It was reported that there has been limited research into the prevalence of dental pain and its social impact on children, families and the community.² The authors also proposed that the size and significance of the problem could be used to evaluate and plan preventive and treatment

efforts.²

Thus it was considered important to assess dental pain experience and impact of pain on Grade 3 children and their families served by the NWAFFHP, including the origin of pain, whether pathological, physiological or traumatic. It was also desirable to assess the present capacity of dental services to respond to children suffering dental pain, in order to (a) highlight any significant findings to the appropriate authorities, (b) develop strategies to resolve any encountered problems and (c) provide additional baseline data for assessment of preventive oral health programs implemented at the NWAFFHP.

Materials and Methods

In a preliminary inquiry conducted by Dental Health Educators on pain experience among children attending the 16 segregated schools in KAAMC, approximately 25% reported having pain in the previous four weeks. Using this information the estimated sample size from the 1399 Grade 3 children at the time of the study was 300, using the equation " $n = \pi (1 - \pi) / \sigma^2$ " where " n " is the sample size, " π " is the estimated proportion and " σ " is the standard error, with confidence interval 5%

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(standard error 2.5% on either sides). However, previous experience dictated that a larger number of invitations were necessary to obtain the desired sample. Thus, following approval of the NWAFFH Medical Research Committee and the Department of Culture and Education, invitations were sent to parents of 450 children randomly selected by proportionate representation from the sixteen schools.

A modified interview questionnaire (Appendix) similar to the one used in an earlier study² was translated into Arabic and four Dental Health Educators were trained and tested on twenty paediatric patients attending the NWAFFH for dental treatment. The first three questions were intended for all participants in the study. Children answering 'Yes' to question 3 'Have you had toothache in the last four weeks?' continued with the rest of the questionnaire related to severity, provoking factors, frequency, duration, impact on the child and guardians, and treatment of pain, if any. Those children answering 'No' to question 3 did not proceed any further.

Two male and two female educators visited the eight male and eight female schools respectively, as neither was permitted to enter schools of the opposite gender. Severity of pain was assessed by a visual analogue method using the fingers of one hand, the little finger representing 'only little pain' ('1' on the analogue scale) and the thumb a 'lot of pain' ('5' on the scale), with the middle three fingers representing the numbers '2', '3' and '4' on the scale.

Three dental therapists also received training from a consultant paediatric dentist to distinguish among pain of physiological, pathological and traumatic origins. Criteria for diagnosing pathological pain were the presence of caries, whether associated with or without fistula, swelling (cellulitis or abscess), mobility in teeth not due for exfoliation or recent premature extraction. Criteria for physiological pain were mobility in the absence of caries or history of trauma, recent natural exfoliation or symptoms associated with erupting permanent teeth. Criteria for diagnosis of trauma were history of trauma with or without fracture and/or mobility of teeth. To assess inter-examiner reliability, the dental therapists each examined twenty paediatric dental patients reporting toothache, and obtained a Kappa reliability index of 0.82.

Chi-square and Odds Ratio tests were applied to assess any relationship between the two genders and different variables used in the study.

Results

Of the 450 students (223 males and 227 females) invited to participate in the study a total of 309 (137 males and 172 females) were interviewed, that is a response rate of 68.7%. Of the remaining 141 (84 males and 57 females) 60 returned the consent forms indicating refusal and 81 did not return the forms.

Table 1 indicates the response of all participants to Questions 1-3 of the questionnaire where 67.3% of children reported dental pain at any time, 27.2% reported crying as a result of pain and 39.5% reported pain during the previous four weeks. Tables 2-7 and 9 are representative of the responses of children (n=122; males=61, females=61) reporting pain within the four weeks prior to interview. Table 2 shows the perceived severity of pain, 34.4% of children reported the highest level of severity of pain and the overall mean was 3.1. Regarding severity of pain in relation to gender there were significant differences in levels 5, 4, 3 and 2 on the scale. Boys, for example, were more likely to report severity level 5 than girls (P<0.01), and girls more likely than boys to indicate level 4 (P<0.01).

Of the 122 children reporting pain in the previous four weeks 32% reported one episode of pain, 36% reported two episodes and the rest

Table 1. Prevalence of dental pain and children reporting crying. (n=309; M=137, F=172)

	Total (%)	Male (%)	Female (%)
Children reporting previous dental pain	67.3	65.0	69.2
Children reporting previous dental pain caused crying	27.2	16.8	35.5*
Children reporting dental pain in previous 4 weeks	39.5	44.5	35.5

*P<0.001, odds ratio (95% confidence interval) 2.72 (1.58-4.70)

reported three or more episodes. At the same time, 36.9% of the children reported pain lasted for minutes, 26.2% reported pain for one hour while the rest of the children said pain lasted for a day or more (Table 3). Overall, 49% of children reported sweet food as the pain-provoking factor, however females were more likely to have pain provoked due to this reason (P<0.005). Also, 21% and 19% of the children reported cold drinks and biting as the provoking factor, respectively (Table 4).

With respect to impact of pain (Table 5) 51.6% of the children reported pain woke them from sleep, with females more likely to wake from sleep

Table 2. Severity of pain reported by children during the previous 4 weeks. (n=122; M=61, F=61)

Severity	Total (%)	Male (%)	Female (%)
1	34.4	27.9	41.0
2	3.3	0.0	6.5*
3	14.8	21.3	8.2†
4	13.1	4.9	21.3‡
5	34.4	45.9	23.0§
Total	100.0	100.0	100.0

Note: 1 = little pain, 5 = a lot of pain

* P<0.05

† P<0.05, odds ratio (95% confidence interval) 0.33 (0.11-0.99)

‡ P<0.01, odds ratio (95% confidence interval) 5.23 (1.4-19.45)

§ P<0.01, odds ratio (95% confidence interval) 0.35 (0.16-0.77)

|| Mean severity of pain = 3.1, standard error = 0.16

Table 3. Frequency and duration of pain. (n=122; M=61, F=61)

Frequency	Total (%)	Male (%)	Female (%)
Once	32.0	39.3	24.6
Two times	36.0	32.8	39.3
Three times	15.6	11.5	19.7
Four times	3.3	1.6	4.9
Five or more times	11.5	11.5	11.5
Do not remember	1.6	3.3	0.0
Total*	100.0	100.0	100.0

Duration	Total (%)	Male (%)	Female (%)
Minutes	36.9	34.4	39.3
One hour	26.2	31.1	21.3
A day	13.1	13.1	13.1
Two days	8.2	9.8	6.6
More than two days	12.3	6.6	18.0
Do not remember	3.3	4.9	1.6
Total	100.0	100.0	100.0

* Mean frequency of pain = 2.21, standard error = 0.12

Table 4. Factors reported by children that provoked pain. (n=122; M=61, F=61)

Provoking factors	Total (%)	Male (%)	Female (%)
Sweet food	49.2	34.4	63.9*
Cold drinks	21.3	26.2	16.4
Biting	18.9	24.6	13.1
Wobbly tooth	7.4	14.8	0.0†
Hot food	3.3	4.9	1.6
Others	12.3	11.5	13.1

Note: Some indicated more than one provoking factor.

* P<0.005 odds ratio (95% confidence interval) 3.37 (1.61-7.09)

† P<0.01

than males (<P0.05).

Of all the respondents, 41.8% had to wake anyone, 13.1% had to wake father and 32% had to wake mother; again females were more likely to

Table 5. Impact of pain on children and guardians. (n=122; M=61, F=61)

	Total (%)	Males (%)	Females (%)
Crying	41.0	34.4	47.0
Got up from sleep	51.6	41.0	62.3*
Woke someone	41.8	27.9	55.7†
Woke father	13.1	14.8	11.5
Woke mother	32.0	16.4	47.5‡
Prevented eating	59.8	55.7	63.9
Prevented playing	41.8	37.7	45.9
Prevented sleeping	43.4	19.7	67.2§
Missed zero days at school	73.0	70.5	75.4
Missed one day at school	21.3	26.2	16.4
Missed two days at school	4.9	1.6	8.2
Missed three days at school	0.8	1.6	0.0
Guardian had to leave work	15.6	11.5	19.7

* P<0.05, odds ratio (95% confidence interval) 2.38 (1.15-4.92)

† P<0.005, odds ratio (95% confidence interval) 3.26 (1.53-6.93)

‡ P<0.001, odds ratio (95% confidence interval) 4.62 (1.99-10.75)

§ P<0.001, odds ratio (95% confidence interval) 8.37 (3.66-19.14)

Mean number of missed school days = 0.34, standard error = 0.06

wake their mothers (P<0.001). Sixty percent of children could not eat due to dental pain, 42% could not play and 43% could not sleep, with females more likely to report inability to sleep (P<0.001). Twenty seven percent of the students missed school days due to dental pain with the mean number of school days missed 0.34 (n=122). At the same time, 15.6% of the parents had to leave work to take children to dentist (mean 0.16, n=122).

Table 6 shows care provided by parents, 45.9% received care by father and 58.2% received care by mother, girls were more likely to receive care from mother (P<0.05) while boys were more likely to receive care from father (P<0.005). Parents gave medication to 36% of the children. Girls were more likely to take medication at home than boys (P<0.05). Approximately 64% of the children felt better after receiving home care (mean 0.64, n=122). Fathers accompanied 42.6% of the children to the dentist.

Only 43% of the children visited a dentist for the dental pain problem with the mean number of visits 0.67 (Table 7). Table 8 shows care received in the dental office by children who visited a dentist for this problem (n=53; males=21, females=32), 43% of the children had their teeth filled, 45% had

Table 6. Parental care for children complaining of pain in previous 4 weeks. (n=122; M=61, F=61)

	Total (%)	Males (%)	Females (%)
Care by father	45.9	59.0	32.8*
Care by mother	58.2	47.5	68.9†
Advised not to eat	2.5	4.9	0.0
Hug	0.8	1.6	0.0
Administered medicine	36.1	26.2	45.9†
Pain subsided after care	63.9	57.4	70.5
Father accompanied to dentist	42.6§	39.3	45.9
Mother accompanied to dentist	4.9§	1.6	8.2

* P<0.005, odds ratio (95% confidence interval) 0.34 (0.16-0.71)

† P<0.05, odds ratio (95% confidence interval) 2.44 (1.17-5.11)

‡ P<0.05, odds ratio (95% confidence interval) 8.37 (3.66-19.14)

§ Statistical difference for father/mother accompanied child to dentist, P<0.001

Table 7. Number of visits to dentist due to pain during previous 4 weeks. (n=122; M=61, F=61)

Number of visits	Total (%)	Male (%)	Female (%)
Nil	56.6	65.6	47.5
One visit	24.6	23.0	26.2
Two visits	13.9	6.6	21.3
Three visits	4.9	4.9	4.9
Total*	100.0	100.0	100.0

* Mean number of visits = 0.67, standard error = 0.08

Table 8. Care provided by dentist (n=53; M=21, F=32).

Dental care	Total (%)	Male (%)	Female (%)
Examined same day	88.7	85.7	90.6
Appointment given	11.3	19.0	6.3
Dentist filled tooth	43.3	42.8	43.7
Extraction	45.4	28.6	56.3
Medication administered	7.6	9.5	6.3
No treatment provided	7.6	9.5	6.3
Other treatment	17.0	33.3	6.3*
Pain stopped after treatment	79.3	100.0	65.6†

* P<0.05, odds ratio (95% confidence interval) 0.13 (0.02-0.72)

† P<0.01

Table 9. General use of dental services. (n=122; M=61, F=61)

Type of dental visit	Total (%)	Male (%)	Female (%)
Never visited a dentist	17.2	18.0	16.4
Visit for emergency only	76.2	77.0	75.4
Visit regularly	3.3	1.6	4.9
No response	3.3	3.4	3.3
Total	100.0	100.0	100.0

teeth extracted, 7.6% had medication and 17% received other treatment. Table 9 shows general use of dentist services where 17% reported never visiting a dentist, 76% reported visiting a dentist for emergencies only and 3.3% reported visiting a dentist regularly.

In children reporting pain within the previous four weeks the cause was considered predominantly pathological (82%), followed by physiological (12.3%) and trauma (5.7%), and 80.3% of the children claimed that the toothache was more severe than any other pain experienced elsewhere in the body.

Discussion

The percentages of children reporting previous history of dental pain and pain within the previous four weeks prior to interview were extremely high (67.3% and 39.5%). These findings appear to be much higher than in a previous study on 8 year-old children living in Harrow, England.² The latter reported 18% crying because of previous dental pain and 8% experiencing pain within the previous four weeks, although it was suggested that the latter could have been up to 22.2% if children unable to remember pain experience were included. The authors, quoting another study,³ indicated that the mean dmft of 5-year-olds in Harrow in 1993/94 was 1.82.

Similar findings to the Harrow group were reported in a Canadian study,⁴ between 5 and 8% of 8-year-olds with a mean dmft of 2.44 experiencing pain in the previous four weeks. The latter study differed in the method, however, where parents were interviewed by telephone rather than by personal interview of the children.

Slade *et al.*⁵ also found a lower percentage of children reporting a history of toothache ranging from 11.8% (5-year-olds) to 31.8% (12-year-olds), and indicated mean dmfs in 6-year-olds and 8-year-olds were 2.61 and 3.95 respectively. The authors also reported toothache and its association with caries experience, suggesting that caries affecting multiple surfaces was more likely to cause symptoms.

Another important factor for consideration is the proportion of untreated decay in the caries index. In the study by Slade *et al.*⁵ the percentages of unfilled teeth in the dmfs indices for 6-year-olds and 8-year-olds were 24.7% and 14.2%, respectively. On the other hand the dmft in 6-year-olds in KAAMC, Tabuk¹ was reported as 7.66 and the percentage of unfilled teeth was 83%.

With the predominant origin of pain deemed to

be pathological (82%), the explanation for the more prevalent history of toothache in the present study was therefore likely to be explained by the higher caries experience and percentage of untreated decay, presuming little change in the latter over the two-year period since the 1998 study.

Assuming levels of 5 and 4 on the analogue scale represented significant pain according to the children, it was noted that the combinations of the two highest levels for Harrow (44.4%) and this study (47.5%) were similar, but otherwise no real direct comparison could be made.

With the relatively high percentages of children reporting high levels, frequency and duration of pain, the reasons why the NWAFFH paediatric dental services are essentially restricted to running an emergency service and making little impact on reducing the levels of untreated, decayed teeth in the community can be readily understood.

As for pain provoking factors, biting and cold were the most frequently reported in the Harrow study, whereas sweet food, cold drinks and biting were the most frequently reported in the present study. These symptoms suggested that most of the pain was due to pulpitis or periapical periodontitis. The high incidence of provocation by sweet food was not unexpected in a society well known for its high consumption of sugar.^{6,7} Girls reported a higher frequency possibly because they tend to be more confined to the house with less emphasis on physical activity compared to boys. At the same time, the fact that more boys reported pain provoked by wobbly teeth was possibly due to earlier shedding of deciduous teeth in girls, but could not be verified without re-examining the children.

With respect to the impact of pain on the children and families, the high percentage of children reporting crying due to toothache within the past four weeks was not surprising given the percentage of children reporting severe pain. However, girls were more likely to get up from sleep and to awake someone than boys. These findings were interesting in that girls reported statistically lower 'lot of pain' levels than boys. Girls either tended to understate the highest level of pain or they had a greater need for parental comfort than boys.

While in this study dental pain prevented eating in approximately 60% of the children in the Harrow study, impact on eating was also reported to be high in 73% of children. These reported high percentages were most relevant given the importance of nutritional needs of children at this

age on general health, growth and development.

The total percentage of children reporting missing school due to dental pain (27%) was higher than the Harrow study, which reported 11.1% of children were prevented from going to school. In other children, who did not indicate any school days missed as a result of dental pain, loss of sleep and reduced food intake may also have affected the quality of time spent at school, especially in females.

Finally, with 15.6% of guardians having to leave the workplace in order to accompany children to the dentist, the impact of dental pain may have been felt more widely in the community, particularly in relation to work productivity.

The percentage administered medicine (36.1%) was similar to that reported in the Harrow study (33.3%), but girls more frequently than boys presumably because of the higher tendency for disturbed sleep in the girls. The medication was most probably an analgesic as most households are likely to have paracetamol elixir readily available. This assumption was speculative, however, and most children at this age would probably have not known the answer even if asked during the interview.

Fathers were much more likely to accompany children to the dentist presumably because women are not permitted to drive motor vehicles in the Kingdom of Saudi Arabia.

A similar percentage of children (43.4%) was taken to the dentist as in Harrow (41.9%), with slightly more than half of these (24.6%) in the present study attending once and 18.8% attending twice or more. Speculative explanations for not taking the children to the dentist include, pain subsided, child unwilling to attend, father unable to take time off work, parental indifference, or difficulty in obtaining a dental appointment. The difficulty in obtaining a dental appointment is a recognized problem in the NWAFFH, department of dental services, due to the shortage of human resources and facilities.

As an idea of the magnitude of the demand on paediatric dental emergency services, the total number of visits by children to dentists in this study group over a period of four weeks was eighty-two. Assuming the group was representative of all Elementary Grade 3 children (n=1399) the theoretical need for emergency treatment in this cohort alone would have been 371 visits per month. When all eligible children, including pre-school and school children, and the demand for routine dental treatment in the community are also taken into consideration, the main reason for

the massive level of untreated decay in the NWAFFH community becomes self-evident.

The majority of children (88.7%, n=53) taken to the dentist, however, were examined on the same day while the others (11.3%) were given an appointment, indicating that paediatric dental services were at least meeting the demand for acute emergency care. Anecdotal evidence has indicated, however, that some of these children may have received care from a private dentist, but this was not verified in the questionnaire. Of the children receiving care, 43.3% (n=53) were treated by filling, 45.4% by extraction, 7.6% with medication and 17.0% by other treatments such as placement of crowns and removal of foreign objects. No treatment was undertaken in 7.6% of the children, presumably in cases where either the child or guardian refused treatment or in children presenting with wobbly teeth.

Symptoms of pain subsided in 79.3% of children treated by a dentist. The rate of success, or lack of success in the remaining 20.7%, could well have been influenced by the presence of multiple carious lesions or the possibility of misdiagnosis of irreversibly inflamed or necrotic pulps treated by filling without pulp therapy. Wobbly teeth may also have been left untreated or the parent or child may have refused the recommended treatment. Strangely, treatment was reported to be 100% successful in boys compared to 65.6% in girls, even though the percentage of fillings was similar in genders and more extractions were undertaken in girls. Perhaps the lower success in girls may have been due to post-extraction pain and the higher percentage of girls suffering reduced sleep. Also, with the perceived earlier development of teeth in girls, there may have been greater progress of caries in the latter. This explanation would be supported by the fact that girls were over three times more likely to report sweet food as the main provoking factor for dental pain in the previous four weeks.

Of the respondents suffering pain in the last four weeks prior to interview 17.2% indicated they had never visited a dentist, 76.2% only visited for emergency treatments and only 3.3% visited regularly, thus bearing out observations from the current policy for paediatric dental services at NWAFFH. Although it is widely emphasized that the first dental visit for a child should be positive and non-threatening, the high percentage of children presenting only for emergency care perhaps explains the high frequency of children, who require restraint in a papoose board or pediwrap in

our experience at NWAFFH.

The NWAFFH Program has already established an Oral Health Promotion Unit comprising a Public Health Dentist, Dental Therapists (5), Hygienists (5) and Dental Health Educators (4), who are tackling the high dental caries experience in the community through parental education in Well Baby Clinics, oral health education in Elementary schools, pit and fissure sealant programs and topical application of fluoride and chlorhexidine gels. Hospital and military authorities have also been solicited to introduce water fluoridation and optimum levels of fluoride into water supplied by private water treatment stations, which are a common source of drinking water in the NWAFFH community. However, it will be several years before any noticeable impact may be achieved and the Hospital Program has an obligation to reduce the level of untreated decay in children. The problem is implementing this task without significantly redirecting resources away from the emphasis on preventive services.

It has been shown that lesions covered with a pit and fissure sealant yielded negative bacterial cultures resulting in arrested dental caries⁸⁻¹⁰ and, based on hand excavation techniques developed by the World Health Organization Collaborating Centre for Oral Health Services Research^{11,12} and the availability of new generation glass ionomer materials, successful conservative caries management programs have been introduced¹³⁻¹⁶ using an approach known as Atraumatic Restorative Treatment (ART).

One of the benefits of the NWAFFH preventive oral health program has been a greater understanding of oral health among Elementary school children and more friendly contact with the dental clinics and the dental professional team through the pit and fissure sealant program. Therefore, it has been considered opportunistic to build on this experience by introducing ART to supplement traditional methods of restorative care. ART is a relatively painless procedure, employing hand instruments to remove demineralized dental tissues and sealing the cavity with an adhesive material such as glass ionomer. The glass ionomer would also provide the additional benefit of fluoride release, and elimination of dental caries would lead to reduction in mutans streptococci and a lower caries risk for the permanent teeth.

Conclusions

The results of this study indicate a high

prevalence of dental pain among 8-year-old children during the previous four weeks prior to interview, which affected their quality of life as measured by impairment to eating, sleeping, playing and school attendance. There was also a negative impact on other family members and the community as a whole.

The large percentage of children reporting pain of pathological origin and attending the dentist only in an emergency indicated that there were unmet needs for dental treatment among children in this age group.

References

1. Stewart BL, Al Juhani TS, Al Akeel AS, Al Brikeet HA, Al Buhairan WH, Al Bundagji NH, Al Deghaishem FA, Abdullah BR. Caries experience in grades 1 and 6 children attending elementary schools in King Abdul-aziz Military City, Tabuk, Saudi Arabia. *Saudi Dent J* 2000; 12:140-8.
2. Shepherd MA, Nadanovsky P, Sheiham A. The prevalence and impact of dental pain in 8-year-old school children in Harrow, England. *Brit Dent J* 1999; 187: 38-41.
3. Pitts NB, Palmer JD. The dental caries experience of 5-year-old children in Great Britain. Surveys coordinated by the British Association for the Study of Community Dentistry in 1993/94. *Community Dent Health* 1995; 12:52-8.
4. Woodward GL, Leake JL, Main PA. Oral health and family characteristics of children attending private or public dental clinics. *Community Dent Oral Epidemiol* 1996; 24:253-9.
5. Slade GD, Spencer AJ, Davies MJ, Burrow D. Intra-oral distribution and impact of caries experience among South Australian school children. *Aust Dent J* 1996; 41: 343-50.
6. Ismail AI, Tanzer JM, Dingle JL. Current trends of sugar consumption in developing societies. *Community Dent Oral Epidemiol* 1997; 25: 438-43.
7. Miladi SS. Changes in food consumption patterns in the Arab countries. *Int J Food Sciences and Nutrition*. 1998; 49:523-30.
8. Going RE, Loesche WJ, Grainger DA, Syed SA. The viability of microorganisms in carious lesions five years after covering with a fissure sealant. *JADA* 1978; 97:455-62.
9. Mertz-Fairhurst EJ, Schuster GS, Fairhurst CW. Arresting caries by sealants: results of a clinical study *JADA*; 1986:194-7.
10. Mertz-Fairhurst EJ, Adair SM, Sams DR, Curtis JW Jr, Ergle JW, Hawkins KI, Mackert JR Jr, O'Dell NL, Richards EE, Rueggeberg F, *et al.* Cariostatic and ultraconservative sealed restorations: Nine-year results among children and adults. *J Dent Child* 1995; 62:97-107.
11. Frencken JE, Pilot T, Songpaisan Y, Phantumvanit P. Atraumatic restorative treatment (ART): Rationale, technique and development. *J Public Health Dent* 1996; 56: 135-40.
12. WHO Collaborating Centre for Oral Health Services Research. *Atraumatic Restorative Treatment Approach to Control Dental Caries Manual*. Third edition, January 1997.
13. Frencken JE, Makoni F, Sithole WD. ART restorations and glass ionomer sealants in Zimbabwe after 3 years. *Community Dent Oral Epidemiol* 1998; 26: 372-81.
14. Mickenautsch S, Rudolph MJ, Ogenbodede EO, Frencken JE. The impact of the ART approach on the treatment profile in a mobile dental system (MDS) in South Africa. *Int Dent J* 1999; 49(3):132-8.
15. Smales RJ. The atraumatic restorative treatment (ART) approach for primary teeth: A review of the literature. *Pediatr Dent* 2000; 22(4): 294-8.
16. Lo EC, Holmgren CJ. Provision of Atraumatic Restorative Treatment (ART) restorations to Chinese pre-school children: A 30-month evaluation. *Int J Paediatr Dent* 2001; 11 (1): 3-10.

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