Original Article

A Three-Way Analysis Of Pain In Pedodontics Through Perspective Of The Child, Adolescent And Dentist

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Abstract

Background: A young dental patient is especially vulnerable during childhood and adolescence, on account of different cognitional prerequisites and developmental processes, intellectual as well as physical, as compared to adults.

Objectives: To explore children's and adolescents' experiences of general, oral and dental treatment pain and to gain insight into the knowledge and attitudes of dentists towards pain management.

Materials and Methods: The responses of 390 children and adolescents (8-19year olds) on the 40 items CPI were examined. Most commonly experienced CPI pain situations were analysed by Exploratory Factor Analysis to reduce the length of the questionnaire. 190 kids with disability (12-18-year-olds) and their matched controls were studied for DDQ. 390 dentists were evaluated for their knowledge of pain management and attitude.

Results: About 50% of the children and adolescents experiencing invasive dental procedures like 'Dental injection', 'Tooth drilling' or 'Tooth extraction', had experienced them as painful. The pain intensity experience was multiplied by having higher dental anxiety, a disability, age less than 14 years old, or gender (female). The disabled children and adolescents had significantly higher DDQ scores as compared to controls, despite similar dental health in both the groups. Dentists with more professional experience and/or female dentists applied better pain management approach.

Conclusion: Kids with or without a disability and the one with higher dental anxiety must be recognised as more vulnerable to pain. Such patients should be offered extra care and also pain relief during invasive dental treatments. Dentists should ensure all children a pain-free dental treatment.

Keywords: child, adolescent, disability, oral, dental, pain, dentist, knowledge, attitude, questionnaire.

INTRODUCTION

Dental care may be associated with pain and discomfort, giving rise to fear and anxiety, particularly among kids with treatment needs. The young patient's pain apprehensions may also add to the situational complexity. This

turns dental health care into a challenging problem. For a disabled young patient, these negative experiences may add to an already difficult situation.

The International Association for the Study of Pain (IASP) defines pain as- 'An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage'.[1]

Here, 'sensory' refers to the senses like touch, hearing, taste, smell or sight; creating a sensation, which is conveyed from the sensory organs, through a nerve impulse to the nerve centres. The term emotional is associated with the state of mind or feelings.

Actual or potential tissue damage suggests that a tissue injury is not required to feel pain. The individual's own cognition, maturity, knowledge and understanding of pain is a prerequisite for how danger or tissue damage is interpreted in a given situation, resulting in the experience or absence of pain. This means that pain is not strictly associated to a stimulus in this IASP definition. Similarly, a nerve impulse transferred to the central nervous system (CNS) is not to be equated with a painful experience.[1,2]

'Tissue damage' is the inflammatory processes following tissue injury or infection that trigger the transmission of a physiological impulse, manifested, for example, as toothache.[3]

The definition of pain has changed over time, suitably to the prevailing scientific view at a specific point in time. In the 1960s, the view on pain was centred towards a multifactorial and subjective experience, having sensory, cognitive, and emotional dimensions. McCaffery opined that pain is 'whatever the experiencing person says that it is, existing whenever and wherever the person says it does'. The idea to promote the patient's own pain definition, helped by self-reporting, is well meaning, but children with developmental intellectual disabilities (who may not, fully or at all, be capable of expressing their experiences) are still not included.

In reference to the immature processing of the nervous system, the current scenario proclaims that the kids, children with an intellectual disability (such as Down syndrome), as well as the adolescent, are more vulnerable to pain than adults.[5-8] These observations impact dental health care, helping the dentist to identify and respond to individual pain susceptibility based on the patient's own pain history.

It has been argued whether repeated exposure to pain stimuli leads to a heightened (sensitisation) or lowered pain threshold (desensitisation) or sensitisation. Data suggest that sensitisation (peripheral or central) is expected to occur more often in neonates and younger children than adolescents.[9,10]

Dental Fear (DF) and Dental Anxiety (DA) combine to constitute the term Dental Fear and Anxiety (DFA), which is not a clearly defined entity. Traumatic dental treatment in early childhood can be an associated factor for evolving DFA, along with the patient's view on dental care into adulthood.[11-14] The child's age and sex also influence the occurrence of DFA. There is a trend for young children to report pain more frequently. Other factors, such as the child's temperament, culture and family background may also contribute to the development of DFA. The unpredictable occurrence of the DFA-initiating factors shows the complexity of fear and anxiety.

A dentist's knowledge and attitude on children's pain perception (DKA-CPP) may influence his/her professional practice. A dentist may not, for instance, ask about the patient's pain experience or offer pain management. Murtomaa et al., 1996, found that half of the dentists did not routinely ask the young patient about pain-associated issues.[15]

Methods for measuring pain and discomfort are Children's Pain Inventory (CPI) and Dental Discomfort Questionnaire (DDQ). Introduced by McGrath, CPI is a self-report which provides hypothetical pain situations for children in order to substitute the graded levels of experimental pain used in adults. The CPI contained a list of 25 situations, generally regarded as pain-provoking situations, and five situations typically considered as not being pain-provoking experiences.[16]

DDQ was developed to detect behaviour in kids, observed by their parents, indicating toothache. Decayed teeth may cause negative and changed manners of eating, chewing and sleeping, or may also be manifested as individually disturbing habits. Interviews were made with the parents with kids having toothache and caries. The information gathered resulted in the DDQ with eight questions. The groups range from preverbal children; i.e.,

toddlers, to children with learning disabilities (6-13-year-olds)[17]. The DDQ can be described as a proxy report for children not able to communicate their dental discomfort adequately.

Anxiety Scale (DAS), on the other hand, measures fear. It's a self-report instrument used to measure DFA. DAS deals with overall dental anxiety and has mainly been used on adolescents as well as adults. It contains four imagined dental situations, each with five response alternatives scoring 1-5, with a total score range of 4-20. A DAS cut-off value for dental fear of 15.0 has been suggested.[18]

The aim of the study was to explore the experiences of general, oral and dental treatment pain in young children as well as adolescents (with and without disability) and also to gain insight into the knowledge and attitudes of dentists to pain management.

METHODS

The groups we studied were Children and adolescents without a disability, Paper I-II, III (control group), Children and adolescents with a disability, Paper III, Dentists at private hospital in India, Paper IV.

For Study group of children and adolescents without disability (Paper I-II), a total of 390 healthy children and adolescents (aged 8-19 years), 'without disability', were invited to participate (Paper I). They were regular patients and consecutive attendants at the hospital. The exclusion criteria were difficulties with Hindi/English language or young age. The compiled data from here were also used for further exploration (Paper II).

For study group of children and adolescents with disability (Paper III), 190 children and adolescents, 80 girls, 110 boys (aged 12-18 years), were divided into four groups based on their intellectual and physical disabilities:

D1	moderate to severe intellectual disability (IQ = 49)	Age 12-8
Da	mild intellectual disability (IQ 50 – 70)	Age 12-14
D2b	mild intellectual disability (IQ 50 – 70)	Age 15-18
D3	Physical disability	Age 12-18

The exclusion criteria were not speaking Hindi/English or a diagnosis of an autism spectrum disorder.

A control group of children without a disability was identified for the participants with a disability (Paper III)

Also, there was a study group of dentists (Paper IV). All general dentists working in the hospital were invited (the age categories were given as < 25 years, 25-35 years, 36-45 years, 46-55 years and older than 55 years). The survey was anonymous.

Three questionnaires were used- CPI original form, DDQ, and DKA-CCP. Pain experience was recorder using the CPI, VAS (Papers I-II). The Children's Pain Inventory (CPI), represented by two different lists previously used by McGrath, was modified. The 23-item 'acute trauma/disease pain' CPI list and four items from the 'acute treatment-related pains' list, were used.[16] The item 'vaccination' was considered a significant source of distress for children and adolescents alike and also included in the modified CPI. An additional ten dental treatment-related items were also added.[19] Hence, the modified CPI had 40 items. The responder was instructed to indicate yes, no, or don't know. If answered 'yes', they were asked to specify whether the experience had been painful, answering 'yes always', 'yes sometimes', 'no never', or 'don't remember'. If the answer was 'yes always' or 'yes sometimes', the pain intensity was marked on a 100 mm Visual Analogue Scale (VAS), where 0 represented no pain and 100 the worst possible pain.

Fear and Anxiety (DFA) was record using the DAS (Paper I) in the group of children without disabilities through four imagined dental treatment-related situations. The sum score range was 4-20.[18] Discomfort and pain

experience was recorded using the DDQ (Paper III) in children and adolescents with disabilities and their matched controls. This measure has twelve items, the response options being- never (0), sometimes (1) or often (2), resulting in a total score range 0 to 24. Data on dental caries in the permanent dentition (DMFT) were obtained from dental records. The latest documented dental status was obtained. Radiographs were not assessed.

In order to assess the knowledge and attitudes among dentists to children's pain and pain management, the form Dentists' Knowledge and Attitudes to Children's Pain Perception (DKA-CPP) was used. It included the following pain categories: A) Views on the care of children in pain, B) Physiology of pain, C) Pain alleviation, D) Pain medication, E) Sociology and Psychology of pain, F) Pain assessment instruments and methods, G) Non-medication methods of pain alleviation, and H) Documentation of pain management; in all 56 items. Data regarding the dentists' age and sex, year of graduation, years of professional experience, and proportion of working time devoted to treating children and adolescents, and parenthood, were collected.

The Statistical package for the Social Sciences (SPSS) was used for Papers I-IV. In all papers, descriptive statistics were compiled and an evaluation of the data type and distributional properties of the variables was performed. On the basis of this, it was decided whether to apply parametric or non-parametric statistical methods in the analyses.

In Paper I, Differences in CPI based on sex, age and DAS were tested by Student's t-test and the Chi-square test. In Paper II, Exploratory Factor Analysis (EFA) was used. This multi-step method was used to reduce the item set. In Paper III, The Mann-Whitney test was used. In Paper IV, Chi-square test and ANOVA were used.

RESULTS:

In children and adolescents without disabilities (Paper I, II), there were significant differences between participants, with regard to whether the everyday and dental treatment pain situations of the CPI had been experienced or not. The most frequently experienced CPI items were 'Fallen and scraped the skin' (N = 356) 'Had a cold' (N = 350) and 'Bitten tongue' (N = 352). The most frequently experienced dental treatment items were 'Dental X-ray' (N = 346; 94 %), and 'Had the teeth probe-checked' (N = 307; 83 %). The least common item was 'Tooth extracted' (N = 135; 37 %).

The children and adolescents reported differently about a painful experience. The most frequently reported pain (> 90 %) among the everyday situations was 'Headache' and 'Stomach ache'. The most common everyday situations were reported as painful equally often by girls and boys. The dental treatment situation most often experienced as painful was 'Dental injection'.

The older group (14-19-year-olds) reported more pain experiences compared with the younger (8-13-year-olds). The younger group commonly rated pain intensity higher. There was a general trend for girls to report pain more often when encountering the CPI situations. For some of the less common everyday situations, statistically significant differences were observed between boys and girls. Typically, these situations were characterised by blunt trauma, or a cut through the skin/mucosa injury/procedure. 'Dental injection' was the only dental treatment situation that girls reported as painful more frequently than boys.

In general, pain intensity, as measured on the VAS, was reported higher for the everyday situations than for the dental treatment situations. Girls generally reported higher pain intensity for all situations. For some of the situations there was a statistically significant difference, such as, 'Headache' and 'Vaccination', as well as 'Bitten tongue'. The dental treatment situations rated with the highest pain intensity were equally rated by girls and boys. In general, children and adolescents in the High dental anxiety group reported higher levels of pain intensity.

A total of 190 children and adolescents, 12-18 years old (mean age 14.6 years) with a disability (D group) agreed to participate. Due to incomplete questionnaires, 140 were analysed. For the same reasons, 130/190 of the sex and age-matched controls without a disability (C group) could be analysed. The main oral problems in the D group were items representing 'Chewing', 'Biting off' and 'Brushing the teeth'.

Of the dentists, 50 % were < 45 years of age. The mean number of professional years of experience for the dentists was 18.3 years. More than 50 % of the male dentists had 0-25 % of their working time allocated to

treating young patients and for female dentists was 26-50 %. Differences in attitudes and knowledge related to the dentists' age, gender and years of professional experience are measured as Knowledge and Attitudes of Dentists to Child Pain Perception (DKA-CPP). A dentist either of 46 years, a female, or had 17 years of experience was more likely to treat the young patient's pain. Examples of items with statistically significant differences due to the age, gender or professional experience of the dentist are presented in Table 1.

Item A1. Children usually tolerate pain better than adults

Age	N	mean	SD	95%CI	P-o	P-a
<46 years	192	4.3	1	4.2, 4.4	.0001	.002
>46 years	190	4.6	.8	4.6, 4.8		
Total	390	4.5	.9	4.5, 4.6		

Item B1. Untreated pain prolongs the time of healing/recovery until the onset of pain relief

Experience	N	mean	SD	95%CI	P-o	P-a
<17 years	190	4.1	.9	4.1, 4.2	.0001	.001
> 17 years	192	4.4	.9	4.3, 4.5		
Total	380	4.2	.8	4.4, 4.1		

Item C4. Usually, the child's pain experience diminishes when a parent is present

Gender	N	mean	SD	95%CI	P-o
F	270	3.6	1.2	3.4, 3.5	.00001
M	115	3.2	1.2	3.6, 3.8	
Total	380	3.4	1.2	3.1, 3.5	

DISCUSSION

This study discovered that the younger children, children with DFA and girls reported everyday pain and pain from dental treatments more frequently. Children with disabilities (D) had statistically significantly more oral discomfort and pain than their matched controls (C). It also found that dentists with long professional experience and/or female dentists had more knowledge on pain management. These dentists can offer better support for the management of pain in children.

The studies, if considered together, demonstrate the significance of recognising pain in dental settings, from the perspective of the child as well as the dentist. The results suggest that dentists should actively seek to identify the vulnerable patients with regard to pain experiences, and practice pain control.

Each questionnaire was a part of a cross-sectional study design; that is, the respondents answered at a single point of time (Paper I, III and IV). The surveys were descriptive and pointed out relationships, and were indicative of influential factors (on the studied variables) (Paper I, III, IV).

Dental professionals in Pedodontics should be well informed about children's most common pain experiences and offer them help when needed. The CPI questionnaire provided significant information on the occurrence of everyday and dental pain experiences among the studied children and adolescents without disabilities. The frequencies and intensity of pain were in accordance with those of other populations. However, at an individual level there was a wide variety of experienced CPI situations. The results most probably reflected the respondents' age range of 11 years (8-19 years).

More than 92 % of the studied children reported having experienced 'Headache' and 'Stomach ache'. Some of the frequently occurring conditions might explain the increasing psychosomatic problems among children and adolescents (manifesting as tiredness, loss of appetite, emotional distress or depression). The prevalence in the reports fluctuates in accordance with the design of the questions. For example, having headache and/or abdominal pain 'a few times a month' was reported by > 50 % of school going children.

The CPI also indicated that 65 % of the 8-19-year-olds had at some point suffered from 'toothache'. Various conditions originating from exfoliation, sensitive teeth or caries might be the reason. However, there are no available data on untreated carious and consequent pain conditions among young Indian children. Hence, timely detection of dentinal caries in young children should aim at controlling the development of painful conditions and the need for invasive treatment with the potential to inflict pain.

Children often fear pain experiences in relation to dental treatment. However, there are very few studies with the aim of observing which dental treatments children and adolescents perceive as painful. Between 55 % and 67 % of the studied children and adolescents reported that they had experienced the CPI dental treatment items of 'Tooth extracted', 'Tooth drilled', Tooth restored', 'Dental injection' as painful.

The child that experiences pain in the dental treatment may subsequently develop DFA, starts to avoid dental appointments, and develop bad dental health. The risk of this negative development indicates the importance of painless dental treatment. To ensure such an outcome, the use of topical analgesia is mandatory before administering anaesthesia. The fact that children reported restorative treatment as painful could indicate insufficient administration of anaesthesia.

Children with already developed DFA or behaviour management problems (BMP) due to painful dental treatment experiences need to relearn dental procedures as more positive experiences. To help such children rebuild their trust in dental care, it is important to ensure proper pain management and comfort. An additional measure is to offer sedatives and administration of analgesics in connection, for example, with tooth extractions. The dentist should use all available means to achieve optimum pain management in every child. Non-invasive dental procedures are occasionally also reported to be painful. Thirty per cent of the studied children who had experienced the oral CPI item 'X-ray' reported the procedure as painful. The explanation could be that radiographic sensors could be perceived as being too big and hard, creating discomfort or pain of the palate or the floor of the mouth.

Regarding the studied CPI dental treatment procedures, the child may perceive any oral intervention as painful in the wrong circumstances. For this reason, dentists need to perform well-practiced invasive as well as non-invasive treatments.

Dentists treating young kids generally take care of both preschool children as well as adolescents. Hence, they need to relate to the characteristics of children's various cognitional and socio-emotional developmental levels. The dentist also has to be familiar with how to manage children's stress, such as DFA, discomfort or pain experiences. The CPI reports also show that age influences the occurrence and intensity

The children younger than 14 years had experienced fewer CPI situations, but reported CPI situations as more painful than the older children. The children's different levels of intellectual maturity and ability to classify and express pain may explain this difference. The CPI outcomes indicate that dentists should make a correct assessment of the child's intellectual and emotional level and meet his/her individual capability when introducing painful dental procedures. The CPI findings indirectly also require an accurate assessment of pain in children. Such an assessment would warrant adequate pain management, which is also a part of treatment success.

The studied girls reported the everyday CPI situations as painful more often than the boys (even if not always statistically significantly higher). In general, studies indicate that girls more frequently display DFA and BMP. The studied girls rated the pain intensity as higher for some situations. Items related to 'sharp objects' ('probe', 'bee/wasp sting', 'knife', and 'vaccination') were common among the items scored higher by girls. It also points to greater vulnerability to pain among girls. 'Dental injection' was statistically significantly more often reported as painful by the girls. It is essential that the dentist does not interpret the results as boys being in less need of pain-management than girls. There may be many intervening processes in play that result in the individual's willingness to report pain.

Children with higher DFA reported significantly higher pain intensity regarding 'Toothache' and 'Vaccination'. All invasive dental treatments: 'Tooth extracted', 'Tooth drilled', Tooth restored', and 'Dental injection', were also statistically significantly rated as more painful by the group with higher DFA. Because of

the relationship found between DFA, pain and pain intensity, it is suggested that dentists should be more observant and communicative on these matters.

The CPI situation, 'Braces tightened,' was given similar scores by the children with lower and higher DFA. This indicates that the children undergoing orthodontic treatment are often highly motivated to endure discomfort.

The participating children with disabilities (D) had various individual functioning difficulties. To group the children into intellectual and physical disability groups was one way to handle the research methodology and make comparisons with controls (Paper III). The D children experienced statistically significantly more oral discomfort and pain compared with their sex and age-matched controls. They also frequently reported oral problems in the areas of chewing, bite-off and tooth-brushing. Such kids with the lowest intellectual capacity showed a higher DDQ score than the children with a higher intellectual ability (and those with a physical disability) which may be a result of oral motor difficulties among some D children, resulting in naturally altered chewing patterns. The high DDQ score in children with physical and intellectual disabilities indicates that they need regular and customised observations by the dental health service.

Responses to the self-report questionnaire, Dentists' Knowledge and Attitudes to Children's Pain Perception (DKA-CPP), showed that at least 17 years of professional experience indicated better knowledge about pain management. Responding dentist's age was also related to better knowledge about children's pain. This must be due to the time allocated to enhancing their experience and knowledge through practice. The study also suggested that female dentists had greater knowledge about pain management in kids.

CONCLUSION

As measured by the CPI, Younger children, girls and children with higher dental anxiety (8-19-year-olds) experienced day to day as well as dental treatment-related pain more frequently and occasionally with more intensity. The original CPI with 40 questions and the reduced CPI with 14 questions were both found to be equally useful. Children with an intellectual or physical disability (D) experienced oral discomfort and pain (DDQ) more frequently than their matched controls (C) (12-18-year-olds), despite the good dental health in both the D and C groups. Dentists with more professional practice, older dentists, and female dentists used better pain management approach.

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