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Evaluation of Dental Discomfort Questionnaire (DDQ) For Young Children Before and After Dental Treatment under General Anesthesia

Nasser Kaviani, Ghazale Movahed Mohammadi, Arezoo Mahdian*, Neda Ahmady Rozbahan

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Abstract

Introduction: Dental caries in children may have a significant impact on their quality of life and when left unrestored there is a risk of subsequent pain and dental anxiety. Furthermore pain in young children is not always recognized. This study is aimed to present and analyze a follow-up using the Dental Discomfort Questionnaire (DDQ), as an indirect method of assessing pain in young children, before and after dental treatment of children under general anesthesia. **Method and material**: In this single-blind clinical trial 60 healthy children aged 3 to 8 candidate for dental treatment under general anesthesia. After examination and consent from the parent where selected. The forms of DDQ were given to parents to complete them before and after the treatment of their child. After treatment the children were divided to 2 groups of 30 children based on the volume of treatment. The mean score of DDQ was evaluated and compared before and after treatment in 2 groups. **Findings**: There was a significant decrease in the average score of DDQ after dental treatment. However, Pearson correlation showed that children whit palpotomy and crown during treatment or children with higher volume of treatment had higher score of DDQ than other children of study and still continued to difficulty with behaviors listed in DDQ. **Conclusion**: As regards children with high volume of dental treatment including various treatment (extraction, restoration, palpotomy, SSC) are candidate for general anesthesia, doing all the dental treatment in one session under general anesthesia cause the significant decrease in the score of DDQ the time after treatment.

Keywords: Children, Dentistry, Pain, Dental Discomfort Questionnaire, General Anesthesia

Introduction

It is been a long time that attention to children and their teeth are considered. The high prevalence of dental caries and subsequent pain and discomfort that affect the quality of a child's life and the necessity of comprehensive treatment in children patient, cause a special importance in Pediatric Dentistry (Pinkham & Berg, 2005). Dental caries affects the quality of child`s life, such as eating less, sleeping less and experiencing intermittent pain (Thomas & Primosch, 2002). Moreover, it has been reported that early childhood caries probably increases the risk of permanent teeth caries (Vanobbergen et al., 2001) and if dental caries is left untreated, it is more likely that severe infections and chronic pain occur in the near or late future (Ten Berge et al., 2002; Davey, 1989). Therefore, to prevent these problems, paying attention to dental care and strict observance of oral hygiene and necessity of treatment in the field of pediatric dentistry has been recommended. In the pediatric dentistry, treatments are extensive and time consuming, therefore, the level of child cooperation is an important factor in receiving treatment. Dentists have a different behaviour for treating children in contrast with adults. The child's behavior management for achieving ideal cooperation during dental treatment is highly related to the age. These methods include drug and non-drug methods (Pinkham & Berg, 2005).

Majority of pediatric dental patients can be treated in the conventional dental environment. In those children who are unable to tolerate dental procedures comfortably, despite gentle encouragement and adequate local anesthesia, anxiety and pain control will have to go

Nasser Kaviani
Anesthesiologist, Assistant Professor, Dental Research Center and Oral & Maxillofacial Surgery Department, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran.

Ghazale Movahed Mohammadi
Dentist, Isfahan Islamic Azad Dental School (Khorasgan), Iran.

Arezoo Mahdian*
Depatment of Orthodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Neda Ahmady Rozbahan
DDS, MS, Assistant Professor of Pediatrician, Isfahan Islamic Azad Dental School (Khorasgan), Iran.

beyond communicative behavioral modification and physiochemical blockade of the anatomic pathways. Pharmacological management is indicated for children who cannot be managed with traditional behavior management techniques and local anesthesia. The primary purpose of pharmacological management of young children is to minimize or eliminate anxiety. General anesthesia totally eliminates anxiety and elevates the pain reaction threshold. General anesthesia is a controlled state of unconsciousness accompanied by a loss of protective reflexes, including the inability to maintain an airway independently and respond purposefully to physical stimulation or verbal command (Casamassimo et al., 2013).

In a single treatment session under general anesthesia, the whole treatment such as elimination of dental caries was needed and tooth restoration or tooth would be performed (Mc Donald et al., 2011) it cause improvement in the quality of children's life in the future (e.g. eating, sleeping and even speech) (Low et al., 1999; Anderson et al., 2004). Besides the physical improvements after treatment, studies show improvement in the quality of social life for instance smiling, improved school performance, and increased social interaction (White et al., 2003).

Pain is a complex and multidimensional phenomenon, which is not always recognized easily in young children. As a result of cognitive immaturity, and perhaps the consistency of the pain over a long period, or entertainment and child`s playfulness, children with several dental caries do not always verbalize their feelings of pain. In these cases, parents are an important source of information for the diagnosis of pain. Through the early recognition of toothache, caries can possibly be detected at an earlier stage, before other teeth become affected. This not only could prevent an aggressive treatment or need for general anesthesia but also reduce child`s fear. It has been shown that children with an experience of painful treatment in an early age have a higher risk of anxiety compared with children with healthy teeth (Ten Berge et al., 2002; Levine et al., 2003).

For that reason, indirect methods for diagnosing the pain through behaviour and habits have a great importance. Therefore, researches help parents in finding ways for recognizing their children`s pain (Reid et al., 1995).

Based on studies, a list of specific behaviours that children reveal because of pain, have been reported such as changes in eating habits, and sleep quality and other pain-related behaviours that are easily noticeable (Chambers et al., 1996). So this behaviour can be employed to create a specific criterion called DDQ (Dental Discomfort Questionnaire). DDQ is a questionnaire that can be used to identify toothache in young children by their specific behaviour. DDQ is registered according to the description of children`s behaviour as a result of dental problems by their parents, and there is a strong relationship between the behaviours of the DDQ and toothache in young children. Furthermore, it has been proved that the DDQ has a good predictive value for the existence of toothache (Versloot et al., 2004).

Versloot J and his colleagues in 2005 utilized DDQ as an instrument to assess dental discomfort or pain before and after treatment for 61 children 30-59 months. After evaluation, a significant reduction has been observed in the average number of behaviours related to toothache after treating children (Versloot, et al., 2005).

In a study in 2006 by Veerkmp JSJ and his colleagues to assess DDQ in 146 children with a mean age of 47 months, the possible differences in behaviors related to pain among children having toothache or not as well as among children with or without decayed teeth were examined. The results demonstrated that children suffering from toothache and decayed teeth showed a significant tendency to show all of those eight behaviors in DDQ compared with children without dental caries or toothache, especially behaviors concerning eating or brushing teeth (Versloot et al., 2006a).

Versoolt J and his colleagues in a similar study in the same year 2006 evaluated the impact of dental treatment under general anesthesia on behaviours related to pain among young children. This survey displayed that children treated under general anesthesia show decreased behaviuors related to pain therefore, increased quality of life subsequently (Versloot et al., 2006b).

In addition, Hall- Scullin E and his colleagues in 2008 surveyed 58 children suffering from disabilities (6-13 years). This study showed that DDQ could be helpful to diagnose toothache in children with disabilities and limited talent to express their pain (Versloot et al., 2008).

The purpose of this study is to evaluate DDQ as an instrument for diagnosing pain in children before and after dental treatment under general anesthesia; so it would determine how that DDQ score can be changed or improved through one-session treatment.

Materials and Methods

This study was a prospective single blind clinical trial. The study was approved by the Research Deputy Department and approved by the DDQ forms and coordination of operating room (School of Dentistry of ESFAHAN). At least 60 healthy children (ASA I, II) in the age

of 3-8 who were accepted to be treated in the operating room under general anesthesia for dental treatment purposes meeting the inclusion criteria have been selected for this study.

On appointment day, before starting the study, parents have been informed about the study and justified for completing the DDQ translated in Persian. A written confirmation, which is confirmed by three experts, was received from parents.

Then, the children in the same way and by using the drug sodium thiopental, fentanyl, and atracurium with doses that were recommended in the textbooks were anesthetized. Anesthesia has been kept with oxygen, nitrous oxide and isoflurane with recommended doses in textbooks. During anesthesia, the patients were under the standard care. Then a specialist in pediatric dentistry performed dentistry procedures, which included doing all the dental treatments required. After that another form included demographic patient data (age, sex, weight, history of disease, group ASA) and the type and number of dental treatments for children, has been completed. After completion of treatment, the patient became awake and placed under a standard care in recovery room. Finally, when patients had the conditions to be released by the way of PADS system, they were released with the proper release instructions based on the operating room protocols of dental faculty.

After treatment, the amount of dental treatment for each patient was determined. Therefore, based on the extent of treatment performed, patients were divided into two groups: medium and high extent of treatment [the medium group consisted of patients with three-four restoration, three - four extraction and three - four SSC and in the group with high extent of treatment, patients with five or more restorations, five SSC and higher or with five extraction and more were placed]. This study were continued to reach at least 30 persons. Afterwards, two DDQ forms for evaluating DDQ after one week and one month were placed in two envelopes with needed stamp and written college address given to parents. Then parents were asked to send that letters one week and one month later.

The exclusion criteria were individuals who did not cooperate to fill the DDQ form and individuals who had medical problems under general anesthesia status.

In this research the way of collecting data, was filling the questionnaires. Data collecting tool includes DDQ questionnaire and another questionnaire that includes personal information and treatments were done for the patient.

DDQ is a questionnaire designed to diagnose and evaluate pain in young children. It includes the certain behaviours displayed often by children who are suffering from dental pain or dental discomforts.

DDQ form includes two parts. The first part includes a single question and a total question about children's toothache that is asked from their parents. Parents can respond to this question in four ways: never, sometimes, often, I do not know. The second part includes eight questions that these questions show the specific behaviours in children changed as a result of toothache or decay. These questions consist of: feel pain or discomfort while brushing, avoid eating sweet food, have problems with chewing and chewing with one side, bite with the posterior teeth instead of anterior teeth, bite cheek or lip while eating, crying during eating. Based on how often the child shows that specific behaviours, the questions are answered on a 3-point scale: 0“never”, 1 “sometimes”, and 2 “often”. Therefore, the range of sum scores is from 0 to 16, because of the number of questions in DDQ.

Results

In this study, 60 patients entered the research with the age of 3-8 years, After treatment, these patients were divided into two groups, including 30 patients in each group.

Comparison of average scores of DDQ at three different times is demonstrated in Table 1.

As it can be seen, the average score of DDQ before treatment, one week after treatment and one month after treatment is 11/6, 4/2, 1/03 respectively. Variance analysis test with Repeated Measures ANOVA showed that the average score of DDQ were significantly different in three times ($p<0.001$).

In addition, as it is shown in Table 1, DDQ scores significantly decreased over time

Table 1. the average score of DDQ at different times

Time	Score DDQ			
	average	Standard deviation	Minimum	Maximum
before treatment	11.6	3.5	3	16

1week after treatment	4.2	3.1	0	13
1month after treatment	1.03	1.7	0	7

Table (2) shows average score of DDQ at different times based on the extent of treatments of the patients. According to this table, the average scores of DDQ was before treatment in patients with an medium extent of treatments of 11.08, and in patients with high extent 12.15, one week after the treatment the first group of 2.7 and the second group of 5.7 and a month after treatment in first group was 0.56, and the second group was 1.5. Independent t test showed that the average score of DDQ before treatment did not differ in two groups with medium and high extent (P=0.21). However, a week after treatment (P< 0.0001) and one month after treatment (P=0.01) the average scores of DDQ in the group with high extent was significantly greater than group with the low extent (DDQ score after treatment is associated with extent of treatment).

Table 2. average of DDQ Score in different times based on extent of treatments of patients

time	Medium extent		High extent		
	average	Standard deviation	average	Standard deviation	
before treatment	11.08	3.2	12.15	3.8	0.21
1week after treatment	2.7	2.3	5.7	3.04	P<0.001
1month after treatment	0.56	1.1	1.5	2.1	0.01

Also as shown the Table (3), the relationship between DDQ and the types of dental treatments for children was investigated. According to this Table, the Pearson correlation coefficient showed DDQ score before treatment did not have a significant relationship with SSC (p>0.05, r=0). However, extraction and pulpotomy variables had a direct relationship with DDQ score (p<0.05, r>0) restorative operation had an inverse relationship with DDQ score (p<0.05, r<0).

After treatment, DDQ score had direct relationship only with pulpotomy and SSC and there was no relationship with other variables.

Table 3. Pearson correlation coefficient (r) between DDQ and different dental intervention

variable	DDQ before treatment		DDQ after treatment	
	r	P-value	r	P-value
restoration	0.43	p<0.001	0.135	0.135
pulpotomy	0.55	p<0.001	0.575	p<0.001
SSC	0.021	0.434	0.369	0.001
Extraction	0.268	0.01	0.061	0. 308

Discussion

This study revealed that the averages of DDQ scores at three different times were significantly different (P<0.001), it means that the mean score of DDQ one week after treatment is significantly lower than before treatment and also one month after treatment was less than a week after treatment.

So according to our hypothesis, the average number of observed behaviours in DDQ after treatment dramatically reduced among children, these children showed fewer problems on those eight behaviours.

VERSLOOT J and his colleagues in 2005 compared DDQ before and after pediatric dentistry treatment and a significant reduction in the average number of behaviour related to pain have been observed after treatment, similar to our results in this present study (Versloot, et al., 2005).

Veerkamp JSJ and his colleagues in 2006 investigated the DDQ among young children. They observed that the behaviours mentioned in DDQ were done more by children with dental caries and toothache compared with children without dental caries and toothache. DDQ was used as a tool for evaluating pain. The results were similar to the present study (Costa et al., 2011).

Low & Tan in 1999 studied the possible impacts of extensive dental caries on the quality in young children. A significant change in complaining pain, the way of eating and amount of food they eat, sleep habits have been observed after dental treatment, which was a confirmation of mentioned studies (Low et al., 1999).

In this present study, DDQ score after treatment had a direct correlation with extent of patient's treatment. Children with higher extent of treatments had more dental problems and high DDQ score after treatment compared with medium extent of treatment; these children showed DDQ behaviours more than children with lower extent of treatment.

In the present study, it was also shown that, a relationship between the DDQ with a variety of dental treatments that before treatment this relationship was direct with extraction and pulpotomy and reversed with restorative operation. Before treatment children who had higher score of DDQ, in other words who had more dental problems, often required more aggressive treatment, such as extraction and pulpotomy. On the contrary, those who had fewer dental problems, were required restorative treatment. However, after treatment, the direct relationship of DDQ score was observed only with palpotumy and SSC, furthermore, no significant relationship was observed with other kind of treatments. The children who were treated by pulpotomy and SSC, after treatment their dental problems improved less than children with other kind of treatment were, at least after one month. The cause of pain in these children due to the presence of SSC that caused much pressure to the soft issue and the more number of crowns caused more pain.

Costa and Harrison in 2011 investigated the diagnosing factors affected in the increasing intensity of discomforts after treatment. The study showed that postoperative discomforts in the recovery room occurred, under the influence of the number of SSC and space retainer, moreover, an inverse relationship was observed between sleep duration in the recovery room and discomfort after treatment. The result of this study about SSC was similar to present result (Costa et al., 2011).

Versloot J and his colleagues in a study in 2005 examined, firstly DDQ before and after dental treatment of children and secondly, the relationship between extraction during treatment with DDQ scores; they found that children who had extraction in their treatment, after treatment showed little change in their behaviors and higher DDQ score. However, their result was opposite to the present study (Versloot et al., 2006).

Conclusion

Regarding the children with high extent of dental treatment including (extraction, restoration, pulpotomy, SSC), those who are candidate for general anesthesia, doing all the dental treatments in one session under general anesthesia causes a significant decrease in the score of DDQ after treatment.

It is suggested that larger age level and more samples be selected, besides the comparison of DDQ score with other drugs and other techniques of anesthesia, divided groups based on the number of SSC performed in the future study.

References

Anderson, H. K., Drummond, B. K., & Thomson, W. M. (2004). Changes in aspects of children's oral-health-related quality of life following dental treatment under general anaesthesia. *International Journal of Paediatric Dentistry*, *14*(5), 317-325.

Casamassimo, P.S., Fields, Jr H.W., McTigue D.J., Nowak A. (2013). Pediatric dentistry: infancy through adolescence.5 th ed. Elsevier Health Sciences; 105

Chambers, C. T., Reid, G. J., McGrath, P. J., & Finley, G. A. (1996). Development and preliminary validation of a postoperative pain measure for parents. *Pain*, *68*(2-3), 307-313.

Costa, L. R., Harrison, R., Aleksejuniene, J., Nouri, M., & Gartner, A. (2011). Factors related to postoperative discomfort in young children following dental rehabilitation under general anesthesia. *Pediatric dentistry*, *33*(4), 321-326.

Davey, G. C. (1989). Dental phobias and anxieties: evidence for conditioning processes in the acquisition and modulation of a learned fear. *Behaviour Research and Therapy*, *27*(1), 51-58.

Levine, R. S., Nugent, Z. J., & Pitts, N. B. (2003). Pain prediction for preventive non-operative management of dentinal caries in primary teeth in general dental practice. *British dental journal*, *195*(4), 202.

Low, W., Tan, S., & Schwartz, S. (1999). The effect of severe caries on the quality of life in young children. *Pediatric dentistry*, *21*(6), 325-326.

Mc Donald RE, Avery DR, Dean JA. (2011). Hospital Dental services for children and use of general anesthesia. Adolescent and pediatric Dent. 277-95.

Pinkham JR, Berg JH. (2005). The practical importance of pediatric dentistry. Pinkham JR, Casamassimo PS, McTigue DJ, editors. 4: 2-8.

Reid, G. J., Hebb, J. P., McGrath, P. J., Finley, G. A., & Forward, S. P. (1995). Cues parents use to assess postoperative pain in their children. *The Clinical journal of pain*.

Ten Berge, M., Veerkamp, J. S. J., & Hoogstraten, J. (2002). The etiology of childhood dental fear: the role of dental and conditioning experiences. *Journal of anxiety disorders*, *16*(3), 321-329.

Thomas, C. W., & Primosch, R. E. (2002). Changes in incremental weight and well-being of children with rampant caries following complete dental rehabilitation. *Pediatric dentistry*, *24*(2), 109-113.

Vanobbergen, J., Martens, L., Lesaffre, E., Bogaerts, K., & Declerck, D. (2001). The value of a baseline caries risk assessment model in the primary dentition for the prediction of caries incidence in the permanent dentition. *Caries research*, *35*(6), 442-450.

Versloot, J, Veerkamp, J.S.J., Hoogstraten, J., (2006a). Dental Discomfort Questionnaire: assessment of dental discomfort and/or pain in very young children. Community Dent Oral Epidemiology. 34: 47–52.

Versloot, J., Hall-Scullin, E., Veerkamp, J. S., & Freeman, R. (2008). Dental Discomfort Questionnaire: its use with children with a learning disability. *Special Care in Dentistry*, *28*(4), 140-144.

Versloot, J., Veerkamp, J. S. J., & Hoogstraten, J. (2004). Dental Discomfort Questionnaire: predicting toothache in preverbal children. *European Journal of Paediatric Dentistry*, *5*, 170-173

Versloot, J., Veerkamp, J. S. J., & Hoogstraten, J. (2006b). Dental Discomfort Questionnaire for young children following full mouth rehabilitation under general anaesthesia: a follow-up report. *European Archives of Paediatric Dentistry*, *7*(3), 126-129.

Versloot, J., Veerkamp, J. S., & Hoogstraten, J. (2005). Dental discomfort questionnaire for young children before and after treatment. *Acta Odontologica Scandinavica*, *63*(6), 367-370.

White, H., Lee, J. Y., & Vann Jr, W. F. (2003). Parental evaluation of quality of life measures following pediatric dental treatment using general anesthesia. *Anesthesia progress*, *50*(3), 105.