Prevalence of systemic and local disturbances in infants during primary teeth eruption: a clinical study

ABSTRACT

**Aim** The purpose of this study was to find the correlations between local and systemic manifestations during primary teeth eruption and the eruption of various groups of teeth.

**Materials and methods** The infants selected for the study purpose were between 6 months to 3 years of age who had at least one erupting tooth. The study group consisted of 894 infants and other 550 infants served as a control group. Questionnaires were distributed to all parents and the data was collected. Chi square test was performed to analyse the information obtained between the two groups. There were 378 girls (42.2%) and 516 boys (57.7%) in the study group. The control group consisted of 195 girls (35.4%) and 355 boys (64.5%).

**Results** The most common finding was gingival irritation 821 (95.9%) and the least common symptom observed in the study was running nose 234 (27.3%). The presence of fever – diarrhea was seen in 101 (11.7%) infants. In the control group, 92.1% of the infants did not show any clinical manifestations.

**Conclusion** An association was found between primary teeth eruption and local and systemic manifestations. Most manifestations were found during eruption of the primary incisors.

**Keywords:** Infants; Pain; Salivation; Teething.

Introduction

A child’s primary teeth, sometimes called “baby teeth,” are as important as the permanent ones. Primary teeth, which often begin to appear when children are about 6 months old, help them chew and speak. They also maintain the space in the jaws for permanent teeth that are developing under the gums. The front four teeth usually erupt first, beginning as early as 6 months after birth. Teething has traditionally been the explanation for a variety of symptoms and signs in the young child, both by parents and their dentists and doctors. But teething is a normal physiological developmental stage that usually occurs without problems. It consists of the movement of the tooth from its intraosseous position in the jaw to eruption in the oral cavity. It involves gingival as well as other tissues and physiological mechanisms.

Today it is still not clear if tooth eruption actually leads to systemic and local disturbances.

An association was found between primary teeth eruption and alterations such as irritability, gingival irritation, increased salivation, fever, agitated sleep, diarrhoea, and loss of appetite [Praetzel et al., 2000; Bengston 1998]. Hippocrates in the 5th century B.C. observed that during teeth eruption children had gingival scratching, convulsions, fever and diarrhoea [Rabdill, 1965].

A study on children with erupting primary teeth reported that 66% of them displayed systemic symptoms during eruption [Carpenter, 1978]. These disturbances are responsible for the referral of many infants to paedodontists and paediatricians. Parents connect these phenomena with the eruption of primary teeth. Fever, diarrhoea, drooling, dermatitis, reduced appetite, constipation, restlessness, and respiratory infections are the general symptoms often associated with tooth eruption as reported in literature [Lloyd, 1996; Mackin et al., 2000]. The symptoms above can appear before eruption or during the eruption of the tooth; they also vary among children. Pain and inflammation of the eruption site, as well as irritable behaviour, are also described during teeth eruption. Earlier studies have reported that a rise in body temperature to 39°C has been observed during eruption of primary teeth [Jaber et al., 1992].

In India, such correlation has not been studied, therefore we conducted this study to determine the occurrence of local and systemic disturbances in children during primary teeth eruption and to assess the correlation between those symptoms and the eruption of various groups of teeth.

Methodology

A study was conducted at the Department of Paediatric and Preventive Dentistry, Institute of Dental Sciences, and the Department of Paediatrics, Rohilkhand Medical College of Dental Sciences, Bareily, Uttar Pradesh state, India
College, Bareilly, India. The sample consisted of 1,023 infants aged 6 months to 3 years who exhibited at least one tooth in the process of eruption. Eruption was defined as visible clinical crown of the tooth, but not exceeding 3 mm of exposure in the oral cavity. The study was conducted from August 2009 to July 2010.

Out of 1,023 infants only 894 were selected for the study, the others were excluded due to lack of information or were missing at the recall visit; 550 infants acted as control group. All children were healthy and born at term. Infant's body temperature was measured by the nurse after dental examination.

Parents were asked about the occurrence of local and systemic disturbances in the questionnaire-based survey. Patients were then recalled after a 3-month period for evaluation and data were collected again.

Analysis of the records showed the presence of the following symptoms: gingival irritations; diarrhoea; fever; loss of appetite; irritability; increased salivation; running nose; agitated sleep; fever with diarrhoea; fever with increased salivation; diarrhoea with increased salivation; fever with diarrhoea and increased salivation.

Data were analysed using descriptive statistics. χ² analysis was performed on the information obtained from the 2 groups. The level of significance was set at p < 0.5.

Results

Of the 1,023 infants observed, 129 were excluded due to deficient information and lack of cooperation from parents. Of the 856 sample 856 (95.7%) reported some type of manifestations. The parents of the remaining 38 patients did not report any symptom (4.4%) during eruption of primary teeth in their children. There were 378 girls (42.2%) and 516 boys (57.7%) in the study group. The control group consisted of 195 girls (35.4%) and 355 boys (64.5%).

Among the 856 infants (95.7%) who manifested some kind of symptoms, gingival irritation was observed in 821 (95.9%), increased salivation in 809 (94.5%), irritability in 789 (92.1%), diarrhoea in 767 (89.6%), agitated sleep in 452 (52.8%) infants, running nose in 234 (27.3%) infants, fever in 668 (78.0%) infants, loss of appetite in 335 (39.1%) infants. Fever and diarrhoea was reported in 107 (11.7%) infants. Fever with diarrhoea and increased salivation was the symptom reported less frequently, in 6.1% of 53 infants (Table 1).

Infants fever was checked by the paedodontist or pediatrician and later by the nurse. None of the children's parents reported a herpetic infection; during the course of this study also we did not notice any signs of infection in any infants.

In Table 2 we can see the 38 (4.4%) infants who did not show any local or systemic manifestations during eruption of primary teeth. In the control group 92.1% of infants did not manifest any symptom. The most commonly reported manifestation was running nose in 19 subjects of the control group (3.4%), which can be due to seasonal variation or upper respiratory tract infection.

Table 3 shows the clinical manifestations that were present during eruption of primary teeth according to the type of teeth. Local and systemic manifestations were more pronounced during eruption of primary incisors. Gingival irritation and increased salivation were the most common findings. Gingival irritation and increased salivation were consistently the most common findings during eruption of canines and molars.

<table>
<thead>
<tr>
<th>Disturbance</th>
<th>Total</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gingival irritation</td>
<td>821</td>
<td>95.9%</td>
</tr>
<tr>
<td>Irritability</td>
<td>789</td>
<td>92.1%</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>335</td>
<td>39.1%</td>
</tr>
<tr>
<td>Running nose</td>
<td>234</td>
<td>27.3%</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>767</td>
<td>89.6%</td>
</tr>
<tr>
<td>Agitated sleep</td>
<td>452</td>
<td>52.8%</td>
</tr>
<tr>
<td>Fever</td>
<td>668</td>
<td>78.0%</td>
</tr>
<tr>
<td>Increased salivation</td>
<td>809</td>
<td>94.5%</td>
</tr>
<tr>
<td>Fever- diarrhoea</td>
<td>107</td>
<td>11.7%</td>
</tr>
<tr>
<td>Fever - increased salivation</td>
<td>89</td>
<td>10.3%</td>
</tr>
<tr>
<td>Diarrhoea- increased salivation</td>
<td>78</td>
<td>9.1%</td>
</tr>
<tr>
<td>Fever- diarrhoea - increased salivation</td>
<td>53</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

TABLE 1 - Prevalence of local and systemic disturbances during primary teeth eruption.

<table>
<thead>
<tr>
<th>Manifestation</th>
<th>Incisors</th>
<th>Canines</th>
<th>Molars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gingival irritation</td>
<td>711 (83.0%)</td>
<td>356 (41.5%)</td>
<td>408 (47.6%)</td>
</tr>
<tr>
<td>Irritability</td>
<td>321 (37.5%)</td>
<td>234 (27.3%)</td>
<td>219 (25.5%)</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>191 (22.3%)</td>
<td>108 (12.6%)</td>
<td>167 (19.5%)</td>
</tr>
<tr>
<td>Running nose</td>
<td>69 (8.0%)</td>
<td>45 (5.2%)</td>
<td>21 (2.4%)</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>248 (28.9%)</td>
<td>121 (14.1%)</td>
<td>143 (16.7%)</td>
</tr>
<tr>
<td>Agitated sleep</td>
<td>330 (38.5%)</td>
<td>209 (24.4%)</td>
<td>222 (25.9%)</td>
</tr>
<tr>
<td>Fever</td>
<td>254 (29.6%)</td>
<td>105 (12.2%)</td>
<td>111 (12.9%)</td>
</tr>
<tr>
<td>Increased salivation</td>
<td>698 (81.5%)</td>
<td>339 (39.6%)</td>
<td>377 (44.0%)</td>
</tr>
<tr>
<td>Fever- diarrhoea</td>
<td>213 (24.8%)</td>
<td>104 (12.1%)</td>
<td>161 (18.8%)</td>
</tr>
<tr>
<td>Fever - increased salivation</td>
<td>114 (13.3%)</td>
<td>89 (10.3%)</td>
<td>108 (12.6%)</td>
</tr>
<tr>
<td>Diarrhoea- increased salivation</td>
<td>203 (23.7%)</td>
<td>28 (3.2%)</td>
<td>171 (19.9%)</td>
</tr>
<tr>
<td>Fever- diarrhoea - increased salivation</td>
<td>91 (10.6%)</td>
<td>13 (1.5%)</td>
<td>73 (8.5%)</td>
</tr>
</tbody>
</table>

TABLE 3 - Presence of clinical manifestations according to tooth type in the study group.
Discussion

In the literature information on tooth eruption and its complications is contradictory and subjective [Neaderland, 1952; Radbill, 1965; Seward, 1969, 1971 and 1972; Tanner, 1964]. Literature reviews show that many authors believe that tooth eruption is a physiological procedure and it does not cause any distress. To a certain extent local and systemic disturbances occur parallel to the eruptive process [Bloom, 1939; Schwartzman, 1942; Kruska, 1946; Kahtalian, 1980; McDonald and Avery, 1995]. On the contrary many authors have reported that tooth eruption causes fever, diarrhea, loss of appetite, sleep disturbance [Bengston, 1968; Noronha, 1985; Bennet and Spencer, 1986; Rocha et al., 1988; Abujamra et al., 1994], increased salivation, dehydration, cutaneous eruption and gastrointestinal disturbances [Inada, 1999].

In a controlled study, Tasanen [1968] described daytime restlessness, increased finger sucking, gum rubbing, drooling and loss of appetite during teething. Honig [1977] analysed the opinions of 6 paediatricians practicing in the Philadelphia area and found that 18 considered that teething caused fever, 12 that it had altered bowel habits, 10 that it caused skin rashes and only 5 that no signs or symptoms were attributable to teething. In contradiction, a longitudinal study by Tasanen of 126 infants in an institution demonstrated conclusively that the eruption of tooth bore no relation whatsoever to the incidence of infections, diarrhea, bronchitis, fever, rashes, convulsions, sleeplessness at night, or ear rubbing. It was however associated with some restlessness during the day and increase of salivation, thumb sucking, and gum rubbing, and, sometimes, refusal of food [Tasanen, 1968].

Illingworth [1969] in his study reported that evening and nocturnal cry of baby aged 5 to 12 months was not due to teething but to bad habit: the babies had discovered that as they cried at night, they were picked up, played with, and given a thoroughly enjoyable time.

Several authors believe that undiagnosed primary herpetic stomatitis could be the major reason for the systemic symptoms, while others did not find a relationship between herpetic stomatitis infection and teething [Illingworth, 1969].

In the present study, local and systemic symptoms were observed in 856 (95.7%) of infants aged between 6 months to 3 years. The most common manifestation was gingival irritation 821 (95.9%). This is in agreement with previous studies [Barlow et al., 2009; Cunha et al., 2004] in which the authors found that gingival irritation was the most common disturbance. A possible reason for gingival irritation was given by Pierce et al. [1986], who stated that immunoglobulins are present in the tissue of erupting tooth. These immunoglobulins interact with matrix proteins which can lead to stimulation of mast cells which, in turn, cause irritation. This reaction vary in children due to differences in their immunological reaction. A previous study by Peretz et al. showed that drooling was the most common symptom, while Galili et al. [1969] and Carpenter et al. [1978] found out that a high percentage of children had fever.

Increased salivation 809 (94.5%) was the second most common finding. This can be due to maturation of salivary glands, which occurs during this age rather than tooth eruption, as well as inability of the child to swallow saliva [Correa, 1999; Kruska, 1946]. As reported in previous studies, increased salivation can also be due to the fact that teething disturbs the oral cavity, producing irritation and redness of the gums.

Irritability was exhibited by 789 (92.1%) infants. Tooth eruption is supposed to cause an anxiety crisis, perceived in almost in all infants as a mood change, provoking the constant need to be held in the caregiver's arm, with fear reactions triggered by inoffensive stimuli [Giglio, 1983]. Many authors have also suggested that irritability might be due to sleep alterations, with baby presenting insomnia or agitated sleep during primary tooth eruption.

Fever was reported in 668 (78.0%) of the sample. Galili et al. [1969] and Carpenter et al. [1978] reported that multiple tooth eruption may establish a stress condition, during which the resistance against infections is reduced and incidence of infectious diseases is increased. Research works [Bennet and Spencer, 1986] suggested that fever during primary tooth eruption is caused by a human teething virus (HT virus), which remains in latent phase in the alveolar crest and is stimulated during eruptive movements, initiating fever as well as local signs and symptoms, such as gingival inflammation, hemorrhage and pain.

Diarrhoea is associated with tooth eruption and it is mainly due to the contamination of the baby's fingers or objects that are inserted into the mouth [Foster and Hamilton, 1969; Rocha et al., 1988; Kruska, 1946]. In the present study diarrhoea was present in 767 (89.6%) of the infants.

The least frequently reported disturbance was running nose in 234 (27.3%) infants, in agreement with previous studies [Praetzel et al., 2000; Cunha et al., 2004].

As mentioned, dental and paediatric literature projects different views in regard to teething and its manifestations. It is difficult to separate objective sign and symptoms related to primary teeth eruption from changes in child behavior based solely on the parent's subjective view, owing to the extended period of time of teething.

Limitations of the study

The present study was limited by the population, which did not represent all type of population. The study should be done for a longer period of time to find appropriate relationships between eruption of primary teeth and local and systemic manifestations.

Recommendations

Currently various treatments are available for the relief of the discomfort or pain related with eruption of teeth. Many of them have their origins in past centuries.

Rubbing substances on the gums and chewing on hard objects are still very common practices. Chewing on clean, hard, cool objects will give relief from soreness. Chilled teething rings and rattles, cold wet flannels, chilled hard vegetables such as carrots and celery and an ice cube tied in a cloth are all recommended and probably entirely safe. Teething biscuits and rusks are not suitable as they can promote tooth decay.

Lignocaine-containing products have proven to be
effective topical agent in relieving pain and gum irritation. However, many authors advise that these gels alone are largely insufficient to treat the symptom, as they are rapidly washed away by saliva. A sugar-free elixir of paracetamol is the basis for some commercially available products. It is effective particularly due to its analgesic and antipyretic effects. Steward recommended the following approach to the treatment of teething [1972].

- First, give the child teething objects to bite. Cold objects bring greatest relief, so teething rings can be kept in the fridge. All teething rings should be safe and easy to clean. Carbohydrate-containing foods should be avoided.
- If pain is troublesome, use the appropriate dose of a paracetamol elixir, preferably sugar-free. This may be given regularly, every 4–6 hours.
- If additional analgesia is required, lignocaine-based teething gels could be used.

Conclusion

To summarize the teething procedure, Neaderland [1952] described the three most common concepts.

- Teething is a pathological process with a cause-effect relationship between dental eruption and the occurrence of clinical symptoms;
- Teething is a physiological process in which systemic symptoms, which are not related, could appear at the same time;
- Teething is a normal and physiological process in which a few symptoms of disturbance appear as consequences of it.

In conclusion, even though the association between primary tooth eruption and incidence of signs and symptoms is a debatable topic, in the present study 95.9% of the children showed some type of disturbance, thus demonstrating the need for further studies in future to justify this relationship.

References

Correa MSH, Odontopediatria na Primaer Infancia. 1999 pp. 117.