EVALUATION OF DENTAL CARIES IN PRETERM BORN CHILDREN WITH ENAMEL DEFECTS.

ABSTRACT:

Predisposition of preterm born children to systemic illness and metabolic disorders leads to defects in hard tissue calcification. One such defect may manifest as hypoplasia of enamel. Imposed on this is frequent sugar exposure due to chronic medication, lowered immunocompetence that accounts for lower serum IgG IgM and IgA antibodies further predisposes to these children to dental caries. This study is done to evaluate the dental caries in preterm born children with enamel defects.

Key words—pre term, enamel hypoplasia, dental caries.

Introduction:

According to nomenclature of the W.H.O. Pre term births are defined as those birth occurring before 37 completed weeks of gestation, within this groups of births are also included where weight of child is less than 2500 gms at the time of birth.

The early and long term effects of birth prematurely on the physical and psychological growth and development of the child are subjects of considerable interest. Most studies have indicated that in early childhood, preterm born children show significant delay in many areas of physical and psychological growth and development.

Enamel hypoplasia is defined as a defect of enamel matrix formation that results in altered enamel and disturbed calcification. Defects may present as irregularities on the tooth surface and or reduced thickness of enamel. Pathogenic mechanisms of these dental defects are not clear but is likely that both local and systemic factors are involved.

The techniques required to sustain life in preterm infants, like use of laryngoscopy and endotracheal intubation usually results in localized enamel hypoplasia, mainly involving maxillary anterior teeth. Systemic causes related with enamel hypoplasia include vitamin D dependent Rickets, neonatal asphyxia, hyperbilurubine and neonatal infection, osteopenia.

Children born prematurely have higher prevalence of enamel defects in the primary dentition than born at full term.

Permanent teeth (first molar and central incisors) in which deposition begins right after birth are also believed to be affected by hypocalcemia observed in first year of life of preterm born low birth weight children.

Prevalence of development dental defects in prematurely born children vary widely from 20 percent to 100 percent.

Morphologically underdeveloped primary teeth often have fragmentary coalesced deep pits and fissure, particularly on the primary first and second molars in addition to rough surfaces are present on hypoplastic teeth.

These all factors promote food accumulation, plaque formation, bacterial (streptococcus mutans) adhesion and colony forming may lead to quick progression of dental caries.
The present investigation was conducted in order to collect further information about the prevalence of clinically discernible enamel hypoplasia in prematurely born children and as a risk factor to develop dental caries.

Materials and methods:
A total of 200 children in age group of 2-8 years were taken. The study sample comprises of two groups, study and control group. Study group comprised of hundred pre term born children, preterm children were chosen who were born 37 weeks of gestation period or whose weight was less than 2500 gms or less at birth. and other group comprised of 100 full term born children.

Data collection:
Oral examination were carried out by same examiner using natural light and using standard ball ended probe. These children were examined from the children attending the OPD of Christian medical college and Christian Dental College, Ludhiana.
Dental caries were recorded using defs and DMFS for primary and permanent tooth erupted. Separate scoring for both decidous and permanent dentition was done.

Enamel hypoplasia was assessed using modified Developmental Dental defects of enamel (DDE) index. Enamel defects were examined using intraoral mirror and defects using a probe. For the modified DDE index, results. The enamel defect score (EDS) for each individual was assessed

\[ EDS = \sum (EHP \text{ code } \times \text{Number of defective tooth surfaces}) \times 10 \]
Total tooth surfaces at risk

Results.

Table-I

<table>
<thead>
<tr>
<th>Preterm group</th>
<th>Enamel hypoplasia</th>
<th>Number N</th>
<th>defs mean +SD</th>
<th>COMPARISON</th>
<th>DMFS mean +SD</th>
<th>COMPARISON</th>
</tr>
</thead>
<tbody>
<tr>
<td>present</td>
<td>11</td>
<td>8.727 \pm 6.528</td>
<td>( t = 2.901; \ p = 0.005; \text{ Significant} )</td>
<td>1.364 \pm 4.202</td>
<td>( t = 2.126; \ p = 0.036; \text{ Significant} )</td>
<td></td>
</tr>
<tr>
<td>absence</td>
<td>89</td>
<td>4.281 \pm 4.56</td>
<td>0.269 \pm 0.939</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Correlation Coefficient between DDE score and defs, DMFS

<table>
<thead>
<tr>
<th>DDE score</th>
<th>Defs</th>
<th>DMFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDE score</td>
<td>( r = 0.419; \ p &lt; 0.001; \text{ Highly Significant} )</td>
<td>( r = 0.191; \ p = 0.058; \text{ Not Significant} )</td>
</tr>
</tbody>
</table>

\( r \) is Pearson’s correlation coefficient

It shows that DDE score has positive and highly significant correlation with defs (\( p < 0.001 \)). Whereas the correlation with DMFS is positive although it is not significant statistically.
The most relevant findings of the present study was that teeth with enamel hypoplasia presented a significantly higher prevalence of dental caries than was seen in sound teeth without enamel hypoplasia.

In the present study, out of 100 preterm children examined, 11 children had significant scores of enamel hypoplasia when assessed using DDE scores, although in the control group no cases of enamel hypoplasia were found in both dentitions.

When statistical comparison was done, the correlation coefficient between DDE score and defs was found to have positive and highly significant values (p<0.001) which clearly indicate that high scores of enamel hypoplasia predispose these children to high risk of developing dental caries.

Discussion:
Dental caries is a common childhood disease with chronic characteristics modulated by behavior and involving colonization by streptococcus mutans. Although the prevalence of dental caries has decreased remarkably, it still remains the most prevalent pediatric disease. The various etiological factors contributing to dental caries are well known, however the early life events like preterm birth and low birth weight which may contribute immensely to caries still continue to be poorly understood.

The present study’s results confirmed that children born preterm with enamel defects had high caries score. The present study’s results also confirmed the hypothesis that, compared to full-term children, preterm children are more prone to develop enamel hypoplasia. Studies done by Seow et al, Grahnen et al clearly linked increase in enamel defects in the decidous dentition of preterm born children.

Developmental defects of enamel (DDE) can be defined as alterations of dental enamel that result from several disturbances during amelogenesis. Since dental enamel does not remodel, the defects that occur during its formation will be permanently recorded on tooth surface. Enamel hypoplasia has been reported to be presented over majority of preterm children. This condition is likely to be result of neonatal derangements in mineralization due to poor supply and absorption of calcium and phosphate, the disturbed calcium metabolism during the first days of life may be an important factor causing enamel aberrations in the deciduous dentition as it is a proven fact that calcium and phosphate accumulation takes place during the last trimester of pregnancy. The earlier a child is born, the less calcium and phosphate are accumulated.

The other mechanism which is involved is due to immature parathyroid glands as a mature parathyroid glands are responsible for increased absorption of vitamin D and calcium from gastrointestinal tract when cessation of the maternal supply of calcium.

In addition to it, local trauma associated with laryngoscopy and endotracheal intubation also seems to be associated with mineralization disturbances of teeth in preterm children.

Enamel hypoplasia, are clinically important since they can result in increased caries risk, dental sensitivity, increased tooth wear as well as esthetic implications.

Previous studies have described a higher prevalence of Enamel hypoplasia in children born preterm.

Hypoplasia has been considered a significant predictor of dental caries
Lai PY, Seow WK, Tudehope D\textsuperscript{12} found that severe enamel hypoplasia was strongly associated with enamel decay. Y.l.i, JM navia, Jy.bian (1996\textsuperscript{24}) also studied the correlation between dental caries and enamel hypoplasia in 3-5 year old rural Chinese children. They concluded that presence of enamel hypoplasia may be a predisposing factor for initiation and progression of dental caries, and a predictor of high caries susceptibility in preterm born children.

Present study confirms that preterm children with high DDE score had higher caries index which clearly proves that more intense the hypoplastic defect, more likely the child is prone to develop dental caries.

**Conclusion**-

Primary and permanent teeth of the preterm infants can be affected in variety of ways. Risk factors for dental problems are linked to a number of prenatal and postnatal conditions. Early recognition and intervention to treat enamel hypoplasia should be a prime consideration so as to prevent development of dental caries. Education of both health care professionals and parents regarding overall dental health is important not only to minimize problems but also to promote good overall health in preterm born children. Pediatricians as primary care providers have to include oral health care as a part of routine examination and discuss with the dentist whenever an early intervention is required.

**References:**

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