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Effect of Gestational Length in the Width of the Neonatal Line of Teeth

KEYWORDS: Neonatal line, Gestational week, Enamel of teeth, Thickness of neonatal line.

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ABSTRACT *Neonatal line (NNL) is a prominent microscopic feature which separates the enamel formed during intrauterine life from that formed in extrauterine life. The aim of the present study was to calculate the average width of the NNL in the first permanent molar enamel of 10 children. Out of which five were born to mothers with normal gestational week (≤39) and five were born to mothers with lesser/reduced gestationalweek (≥37). The parents of the children were given questionnaire containing questions about the course of pregnancy. All collected teeth were sectioned in the mesiodistal direction using an abrasive Lathe wheel and examined under a light microscope. The average width of the NNL in children born with reduced gestational week was thicker compared to the children born to normal gestational week. In conclusion this study suggests that the length or duration of the gestational week is responsible for the degree of expression of the NNL.*

INTRODUCTION:

Neonatal line (NNL) is an incremental line that separates enamel formed before and after birth. It belongs to a series of a growth lines in tooth enamel known as the striae of Retzius. The neonatal line is darker and larger than the rest of the striae of Retzius. It is caused by the different physiologic changes at birth and is used to identify enamel formation before and after birth[1].

The transition from an intra to extra uterine environment leaves its mark in deciduous teeth and first permanent molars as an accentuated enamel incremental ring called the neonatal line (Fig1). This prominent microscopic feature separates the enamel formed during intrauterine life from that formed after leaving the womb[2].

The ameloblast forms the enamel matrix of the teeth and is very sensitive to physiologic changes. The neonatal line marks the stress or trauma experienced by these ameloblasts during birth. The neonatal line is found in all primary teeth and in the larger cusps of the permanent first molars. In the present study, an attempt was made to study the effect of the duration of gestational week in the width of the neonatal line in children born to the mothers with normal and reduced gestational week.

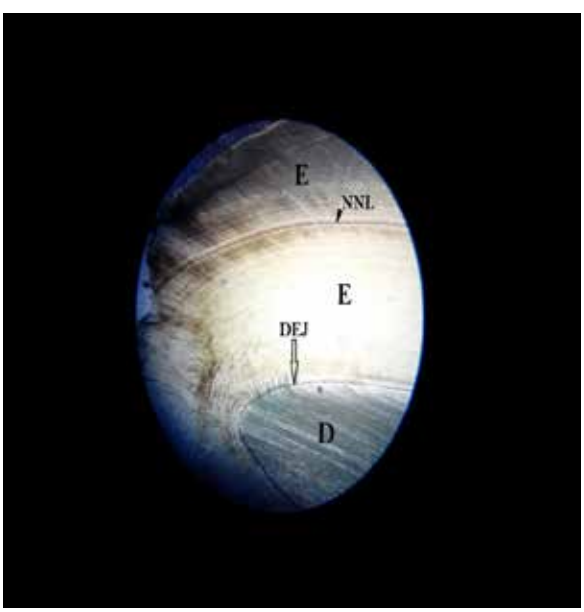

Fig 1: Histological representation of NNL (arrow head) in a 10X sagittal ground section of a primary molar tooth

E- Enamel
NNL- Neonatal line
DEJ- Dentinoenamel junction
D- Dentin

MATERIALS AND METHODS:

The primary first molar teeth of ten children were collected from RVS dental college & hospital, Coimbatore. Among these ten children's, five were born to mothers with normal gestational week and five were born to mothers with reduced gestational week. The normal gestational week is considered as ≤39 week and the reduced is considered as

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≥37 week of length of gestation (Preeclampsia and Gestational diabetes). The parents of the children were informed about the work and they were given a questionnaire containing questions about the course of pregnancy.

The collected teeth were sectioned in the mesiodistal direction using an abrasive Lathe wheel and made into thin section of 50µm using Arkansas stone, examined under light microscope. The width of the NNL was measured using an ocular eyepiece of accuracy up to 0.1µm. The values obtained were analyzed statistically using SPSS for windows (version 22.0, Chicago IL USA). The data were expressed as mean ± SD. The differences of groups were analyzed by students "t" test. The P value ≤0.05 considered as statistically significant.

RESULT:

The average width of the NNL in children born with reduced gestational week was thicker compared to the children born to normal gestational week (Table 1 & Fig 2).

Table 1: Comparison between width of NNL and gestational week of normal and study group:

S.NO	PARAMETERS	Normal group Mean±SD	Study group Mean±SD
1	Average width of neonatal line	11.5±3.8	17.3±4.5*
2	Gestational week	39±9.5	35±8.4*

*significant

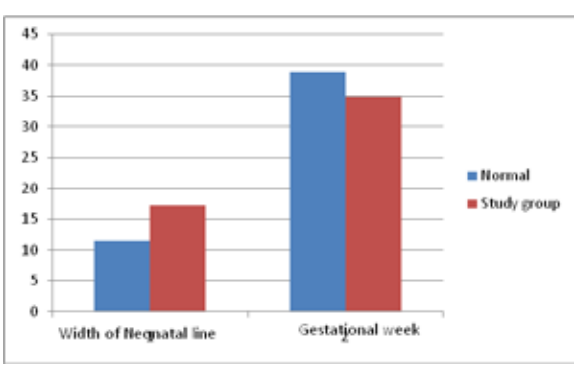

Fig 2: Graphical representation of width of NNL and gestational week of normal and study group

DISCUSSION:

The ameloblasts are the cell layers which continue their steady growth from the dentinoenamel junction to the surface of the teeth during the intrauterine to extrauterine life. Any pathological disturbance or stress in this cell layer will cause a permanent record in the tooth structure called neonatal line (NNL). In the present study the width of the NNL increases significantly in children born to mothers with reduced gestational week compared to the children born to mothers with normal gestational week. This data suggest that the pathological change occurred during pregnancy which resulted in reduced gestational week may have caused disturbance in the function of ameloblast cell layer. This change in the ameloblast cell layer may have caused a wider NNL in the tooth structure of children born to mothers with reduced duration in gestational week. Thus the duration of the gestational week plays a major impact on the growth of ameloblast. The present finding is in accordance with the study of Schour & Kronfeld[3], who have seen prominent NNL in prematurely born children. Weber and Eisenmann[4] reported a wider NNL of about 20-30µm in a prematurely delivered child. The result of the present study also corroborates with the study of Noren et al[5], who obtained a significantly higher incidence of widened neonatal lines in infants of diabetic mothers.

The wider NNL observed in children born to mothers with reduced gestational age may be due to the influence of maternal factors. This data is similar to the study of Zadzinska et al[6] who reported that the thickness of enamel of deciduous incisors depends on the season of birth and maternal factors. According to Clement zanolli et al[7], the gestational length variation influences the degree of expression of the NNL which corroborates with the present study. Similarly another study by Kurek et al[8] supports the present study, that the prenatal environment significantly contributes to the thickness of the NNL influencing the space of reaching the post-delivery homeostasis by the newborns organism.

In conclusion, the present study suggests that variation in the length of gestational week is responsible for the degree of expression of the Neonatal line.

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