

Radiographic Evaluation Of Mandibular 1st Molar Development Based On Nollas Stage Of Tooth Development In 3-6 Year Old Female Children

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Abstract: *Aim: The aim of the study is to evaluate radiographically the development of mandibular 1st molar development based on nollas stage of tooth development in 3-6 year old female children.*

Materials And Methods: *The study includes 8 female children of age 3-6 years. The data was collected from patients records and the data was analysed between June 2019 and March 2020, Saveetha Dental College And Hospital, Chennai. Data was recorded by evaluating IOPA and OPG of 36 and 46. After the evaluation based on nollas stages the values were tabulated and documented. The data was then transferred to SPSS software and chi square test was performed to evaluate the significance.*

Results: *In this study molar development in 3-6 years female children was maximum at the age of 6 years. Lower left molar showed a faster rate of development. When dental age is compared to the nollas stage maximum maturation was present at stage 9 of nollas stage of tooth development.*

Conclusion: *From the study we can conclude that Nollas method can be used to assess the dental maturity. It can be used as an adjunct to the radiological examination for calcification of teeth.*

Key Words: *Dental age, Maturation, Molar development, Nolla's method, Radiograph*

1. INTRODUCTION

Oral health plays an important in general well being of an individual [1,2,3]. It is very important for every dentist to have a good understanding on development of dentition [4]. Premature loss of primary teeth may predispose to crowding ,rotation and impaction of teeth. One of the most common causes for premature loss of primary teeth is caries. Caries can be caused due to accumulation of dental plaque [5]. It has a multifactorial etiology which leads to initiation and progression of a lesion [6]. Early childhood caries is one arising prevalent disease which can be a cause of premature loss of primary teeth [7]. In a primary dentition the best space maintainer is natural teeth itself [8]. The maintenance of primary dentition is essential to guide the eruption of permanent teeth [9]. Pulpectomy is the treatment of choice for non vital primary teeth which will help in maintaining the teeth for a longer period of time in the oral cavity [10,11,12,13,14,15]. Fluoride when present in optimal amounts can also prevent caries formation [16]. Molars play a major role in formation and function of permanent teeth. Radiology plays an important role in determining the developmental status of teeth. Dental radiographs have been used routinely to determine the age [17]. Dental radiographs can also be used to assess any underlying pathology while examining the rate of tooth development. Dental age estimation is of particular interest to pediatric dentists and orthodontists in planning the treatment of different types of malocclusion in relation to the maxillofacial growth [18]. The dental age of children can be determined by evaluating the stages of mineralisation of teeth on radiographic images. The degree of calcification of different stages of teeth will provide the clinician information about the abnormal sequences [19].

The most commonly used method for estimation of dental age is devised by nollas which is used in teaching and clinical practice [4]. This method helps to evaluate the mineralisation of permanent dentition in ten stages. Nollas method can be used to assess the development of each tooth of maxillary and mandibular arch [20]. There are several other methods that have been used to determine the dental age based on the degree of calcification observed while performing radiographic examination of permanent dentition[21,22,23,24,25].

Dental age helps the orthodontist and pedodontist to plan treatment [26]. Any abnormalities in calcification stages helps to diagnose the deviation in growth pattern. There is a good correlation between dental age and chronological age. The correlation can be used as a basis for further therapeutic decisions regarding extending the primary teeth and the timing of the orthodontic treatment [19].

This research is required to obtain information on the amount and kind of variation that is displayed by growth of permanent teeth. The aim of the study is radiographic evaluation of permanent mandibular first molar development based on nollas stage of tooth development in 3-6 year old female children.

2. MATERIALS AND METHOD

This study includes 266 OPG's collected from the department of pedodontics and preventive dentistry, Saveetha Dental College And Hospitals. The data was collected after reviewing patients records and analysed the data from the 86,000 patients between june 2019 and march 2020. The study includes 8 female children of age 3-6 years. Intra oral radiographs of mandibles were also included in the study for the evaluation of 36 and 46 development.

Inclusion criteria was female children of age 3-6 years. Exclusion criteria was male children, female children of other age groups other than 3-6 years. Radiographs were then assessed to evaluate the development of mandibular molars. Radiographic interpretation was done based on the system developed by Nolla to interpret the dental maturation. The data collected were entered in a methodical manner. After the collection of data, it was tabulated based on age, gender, tooth number and Nolla's stage. The data was then transferred to IBM SPSS software version 20. Chi square test was the statistical test that was conducted to analyse the correlation between tooth number and Nolla's stage to determine the significance.

3. RESULTS

The results that were obtained from the study shows that molar development in 3-6 year old female children showed maximum maturation at the age of 6 years. Lower left molar 36 showed a faster rate of maturation than lower right 1st molar. Dental age when compared to Nolla's stage maximum maturation of molars was present at stage 9 of Nolla's stage of tooth development.

4. DISCUSSION

In this present study about 266 OPGs were evaluated out of which 8 were segregated based on 3 to 6 years old female children. Figure 1 shows the development of the mandibular 1st molar. It is evident from the graph that the tooth that shows maximum development is 36 with a percentage of 62.5% and the tooth that shows minimum maturation is 46 by 37.5%. Figure 2 shows that the maximum maturation of mandibular 1st molar was seen at stage 9 of Nolla's stage of tooth development by 75%. Figure 3 shows the correlation between tooth number and Nolla's stage. It was found from the chi square test that the two parameters show a negative correlation with the p value .315. From previous study it was found that there are few developmental differences between the right and left teeth of the same kind [4]. From another study that was conducted by E A Holtgrane reports that females show a faster rate of maturation than male gender [27]. From a study conducted by Adel Tahir Kamal it was reported that female children show a faster rate of maturation than male gender by Nolla's method [28].

Dental system is considered an integral part of the human body. Its growth and development can be studied in comparison with other physiological maturity indicators [29,30]. Nolla's method is accepted as the gold standard method over years [4]. The Nolla's system is based on the developmental stages of teeth. In Nolla's method there are 10 stages of tooth development. Stage 0 is absence of crypt, stage 1 is presence of crypt, stage 2 is initial calcification, stage 3 is 1/3rd crown completed, stage 4 is 2/3rd crown completed, stage 5 is crown almost completed, stage 6 is crown completed, stage 7 is 1/3rd root completed, stage 8 is 2/3rd root completed, stage 9 is root almost completed with open apex, stage 10 is root completion. It is more useful because tooth development is less influenced by environmental factors [31]. Nolla's method was designed primarily for use by clinicians who wanted to know if the dental maturity of an individual deviates from the normal. Nolla's method has two more degrees of mineralisation of crown than the dental age estimation method conducted by Demirjian's method [18]. It has been found that in various studies Nolla's method offered more accurate results for age determination than other methods [32].

The limitation of this study is the small sample size. Future scope of the study is that it can be used in diagnosis and treatment planning as well as used for future research with a larger population.

5. CONCLUSION

From the study we can conclude that nollas method can be used to assess dental maturity. It can be used as an adjunct to the radiological examination for calcification of teeth. It was found that development of the mandibular first molar in the third quadrant showed maximum maturation than the mandibular first molar in the fourth quadrant.

6. ACKNOWLEDGMENT

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AUTHORS CONTRIBUTION

All the authors have equal contribution in bringing out this research work.

CONFLICTS OF INTEREST: Nil

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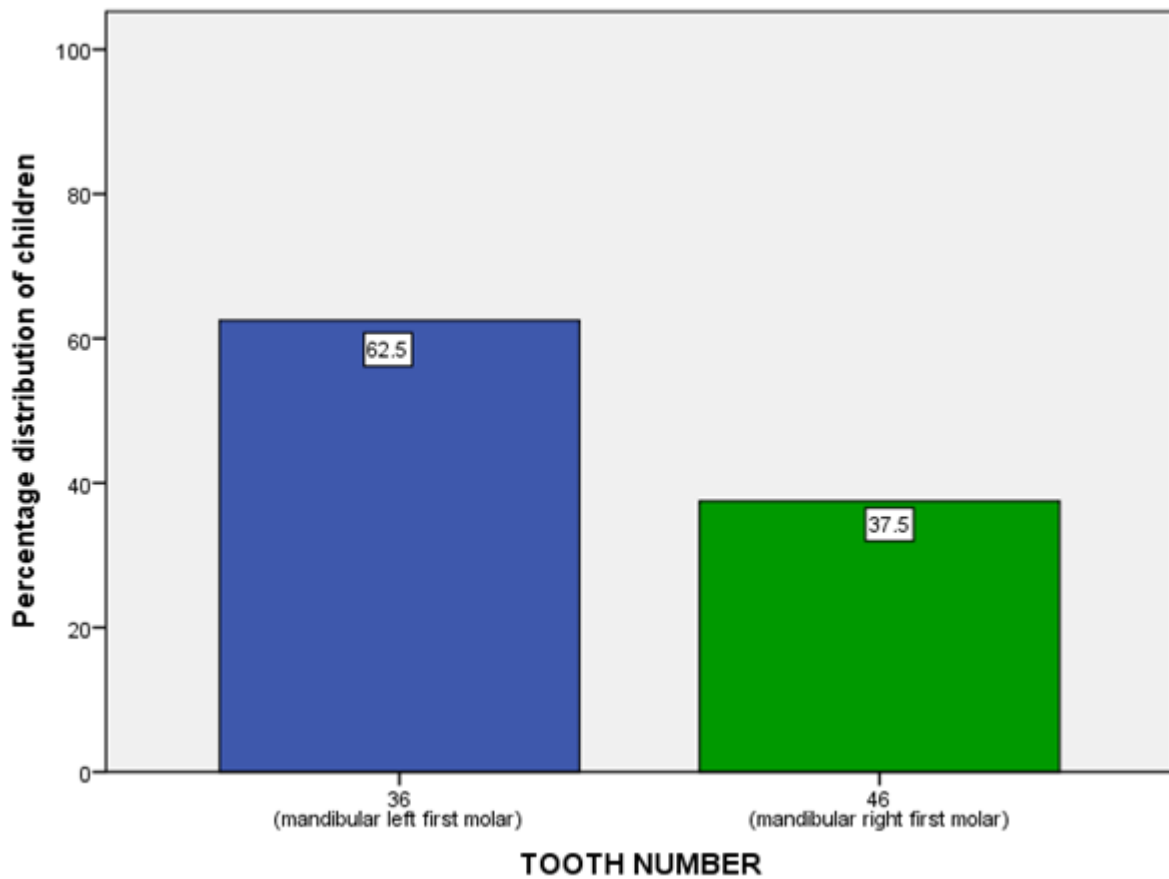


Figure 1: Shows percentage distribution of tooth numbers that were included in the study mandibular left first molar (36) and mandibular right first molar (46). X axis shows the tooth number, Y axis shows the percentage distribution of children. Blue bar denotes mandibular left first molar (36) (62.5%) and green bar represents mandibular right first molar (46) (37.5%). From the graph we can infer that mandibular left first molar (36) shows maximum maturation by 62.5%.

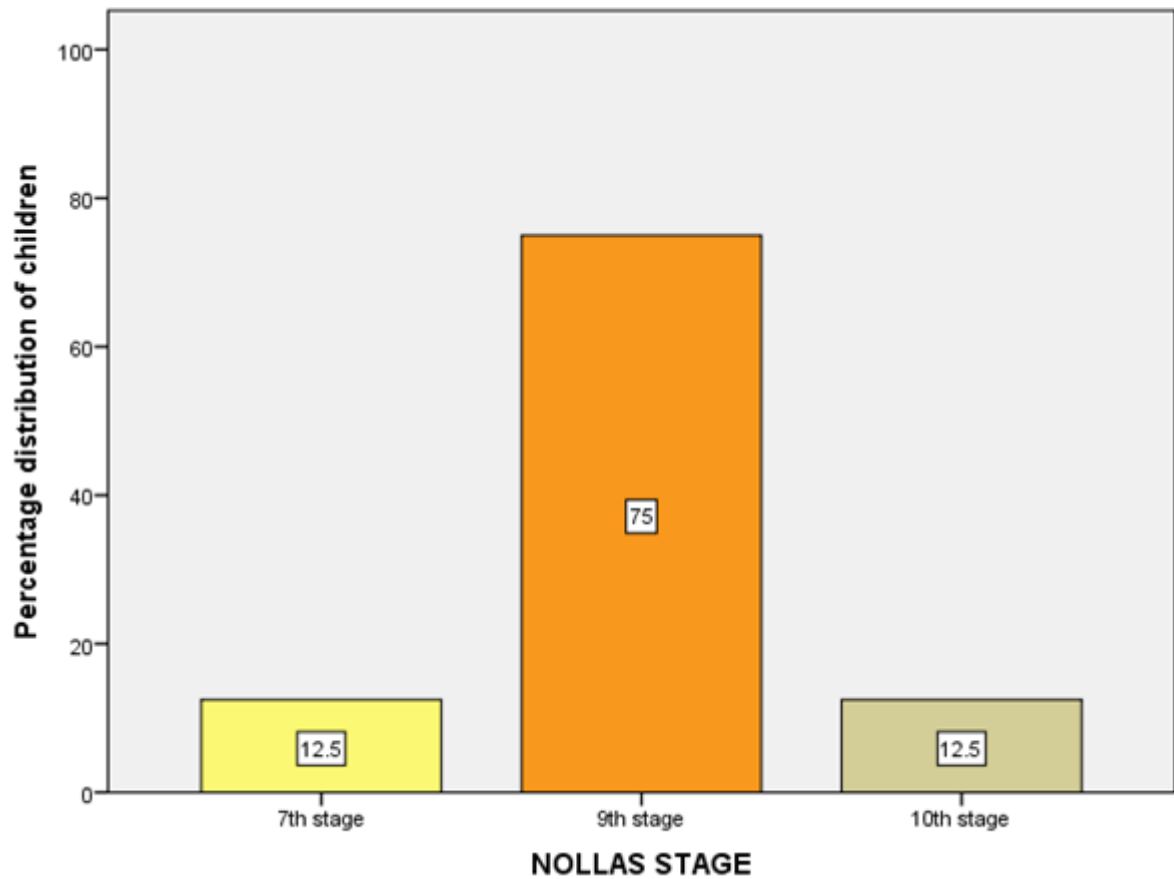


Figure 2: Shows percentage distribution of nollas stage of tooth development of molars in 3-6 year old female children. X axis represents nollas stage and Y axis represents the percentage distribution of children. Yellow bar represents stage 7 (12.5%), orange bar represents stage 9 (75%), beige bar represents stage 10 (12.5%). From the graph we can infer that maximum maturation was present at stage 9 of nolla's method by 75%.

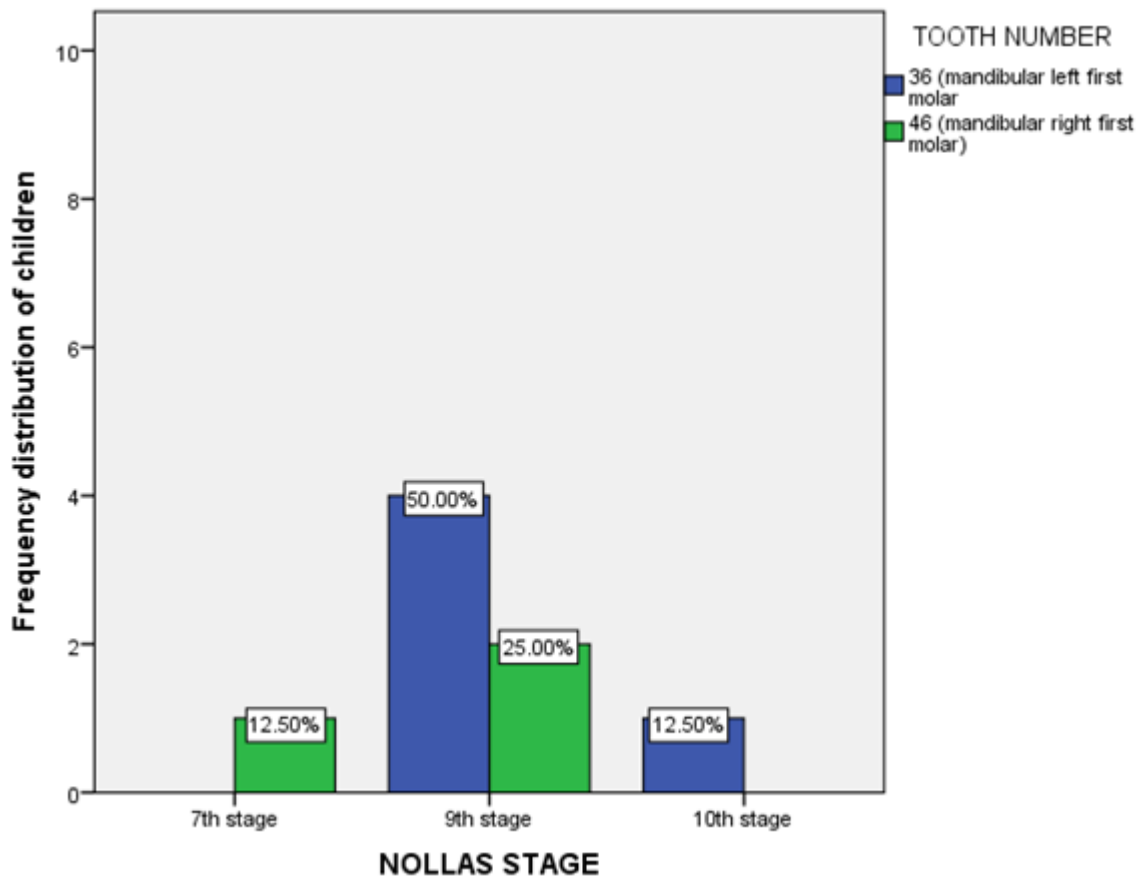


Figure 3: Shows association between tooth number and nollas stage. X axis shows nollas stage and Y axis shows the frequency distribution of children. The blue bar shows mandibular left first molar (36) and green bar shows mandibular right first molar (46). In stage 7, 12.50% of dental maturation was seen in mandibular right first molar. In stage 9 about 50% of maturation was seen in the mandibular left first molar and 25% of maturation was seen in mandibular right first molar and in stage 10 showed 12.50% of dental maturation in mandibular left first molar. However, the difference is statistically not significant (P- 0.315 ($p > 0.05$) hence not significant).