

**To evaluate prevalence of spaced, non spaced dentition and occlusal relationship of primary dentition and malocclusion in school children of Darbhanga district, (Bihar) – A gender comparative cross-sectional study.**

<sup>1</sup>Dr. Md Imran, Senior Lecturer, Department of Paediatric and Preventive Dentistry, Mithila Minority Dental College & Hospital

<sup>2</sup>Dr. Karuna Bharti, MDS Department of Conservative & Endodontics, Mithila Minority Dental College & Hospital.

<sup>3</sup>Dr. Kalpana Thakur, MDS, Department of Paediatric and Preventive Dentistry, Mithila Minority Dental College & Hospital.

<sup>4</sup>Dr. Rudra Mazumdar, M.D.S Department of Conservative Dentistry and Endodontics

<sup>5</sup>Dr. Bharti Anand, Pg Student, Department of Paediatric and Preventive Dentistry, Mithila Minority Dental College & Hospital.

<sup>6</sup>Dr. Samreen Fatma, Senior Lecturer Dept. Of Oral Pathology And Microbiology, Mithila Minority Dental College & Hospital.

**Corresponding Author:** Dr. Md Imran, Senior Lecturer, Department of Paediatric and Preventive Dentistry, Mithila Minority Dental College & Hospital

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### Introduction

Childhood is the mirror that reflects the adulthood. Primary dentition is an indicator of how perfect permanent dentition will be. Primary dentition helps in maintenance of the occlusion and space for the permanent dentition and also mastication.<sup>1</sup> Primary dentition should have optimum amount of spaces. The spaces present between all the primary teeth are termed **Physiological space** or **Developmental spaces**. Spacing which also present between all anterior primary teeth with the most marked

spaces present being mesial to canines in the maxilla and distal to canines in the mandible. These are called **Primate spaces** or **Anthropoid space** or **Simian spaces**.<sup>2,3</sup> In short, spaced deciduous dentition is necessary for the development of permanent dentition and normal occlusion.<sup>4,5</sup> The incidence of spacing in primary dentition varies from 98% (**Bokyo 1968**)<sup>6</sup> to 42.9% (**Treiman 1961**)<sup>7</sup>. Spacing is more common in the maxilla than in the mandible and more among boys than girls.<sup>8</sup> Deciduous dentition spacing plays principal role in the arrangement

of erupting permanent dentition and establishing normal occlusion. The occlusal relationships of primary second molars were noted as Flush terminal plane, Distal step and Mesial step with regard to the vertical plane passing the distal surface of maxillary and mandibular primary second molars. Likewise, the occlusal relationships of primary canines were classified as class I, class II and class III in view of the vertical plane passing the cusp tip of the maxillary primary canine and the distal surface of the mandibular primary canine.<sup>9</sup> Relationship of maxillary and mandibular deciduous canines is one of the most stable relationships in primary dentition, which influences the canine relationship in permanent dentition.<sup>4,7</sup> As suggested by **Davies et al**, canine is an essential tooth to consider in the developing occlusion.<sup>10</sup> The malocclusion can be defined as an occlusion in which there is a mal-relationship between the arches in any of the planes or in which there are anomalies in tooth position beyond the normal limits.<sup>11</sup> The prevalence of malocclusion varies from country to country and also between different age and sex group. The prevalence of malocclusion in India varies from 20- 43%.<sup>12</sup> Hence this study was done to evaluate the prevalence of spaced, non- spaced dentition and occlusal relationship of primary dentition and malocclusion in school children of Darbhanga district (Bihar)

### Materials And Method

The present study was conducted by the Department of Pedodontics and Preventive Dentistry, Mithila Minority Dental college and Hospital, Darbhanga. This Descriptive cross-sectional survey was based on clinical examination of primary dentition of 2797 school children aged 3-5 years from Darbhanga district, Bihar, India. The sample were selected randomly from 52 private school using stratified cluster random sampling method. The age of each child was obtained from school record. All the school

children were screened for spaced and non-spaced dentition (closed Dentition), Primary molar relationship and canine relationship.

### Inclusion Criteria

- 1) Informed consent was obtained from parents / guardian.
- 2) Complete set of deciduous dentition without erupting or erupted permanent teeth
- 3) Absence of extensive carious lesion, loss of coronal tooth structure or proximal restoration that might alter the mesiodistal width of the teeth.
- 4) Absence of syndromes or cleft lip and palate.
- 5) No previous orthodontic treatment/ or speech therapy.
- 6) Absence of dental anomaly of shape, number, structure and eruption.
- 7) Presence of spacing and non spacing dentition (Closed Dentition).

### Exclusion Criteria

- 1) Eruption of any permanent first molar/ incisor tooth not taken a subject.
- 2) Grossly decayed teeth.

### The Following Parameters Were Recorded

**Molar Relationship: Baume (1950)** categorized the primary molar relationship using the distal surface of primary second molars.<sup>3</sup>

- (A) Flush Terminal plane
- (B) Mesial step
- (C) Distal step

**Canine Relations:** Primary canine relationship using the following classification-

- (A) Class 1
- (B) Class 2
- (C) Class3

**Spacing:** There are two categories of spacing.

- (A) Primate spaces
- (B) Physiologic spaces

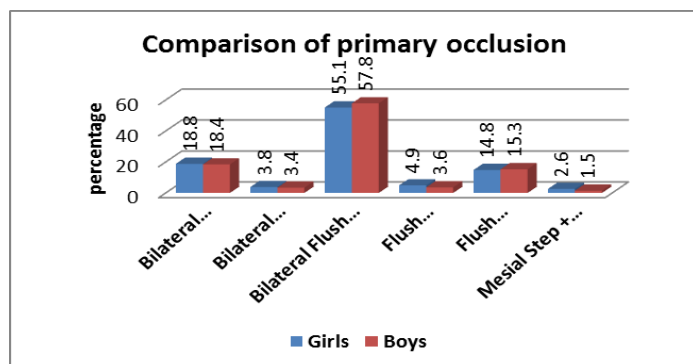
The subjects were examined in their own settlements either in the classroom or in the corridor of the school. The subjects were allowed to sit on a chair or stool, where sufficient natural daylight was available. A table with instruments was placed within easy reach of the examiner. The recording clerk was allowed to sit close enough to the examiner so that instructions could be easily heard and the examiner could see that findings were being recorded correctly. The examination of spaced dentition (Non-spaced dentition), Primary molar relationship, canine relationship were assessed using Foster and Hamilton criteria with the teeth in centric occlusion. Oral examination was conducted using a plane mouth mirror and explorer. Data was analysed using SPSS version 23. Test performed were Frequencies and Chi sq test. Power of the study is 95%.

**Results**

Data was analysed using SPSS version 23. Test performed were frequencies and Chi sq test. The power of the study is 95%.

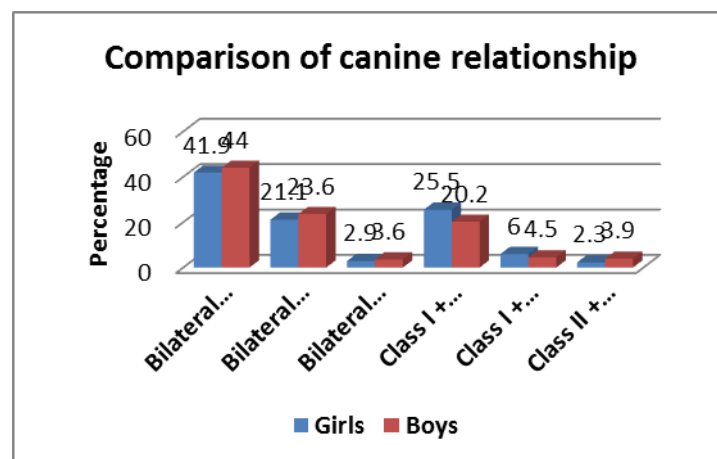
In evaluation of primary molar relationship, there is no statistically significant difference in the type of molar relation between boys and girls (p=0.353). The most common occlusion in both genders were bilateral flush terminal plane (55.1% - Girls, 57.8% - boys), least common occlusion was mesial step + distal step (2.6% - girls, 1.5% - boys)

Graph 1: Comparison of primary occlusion



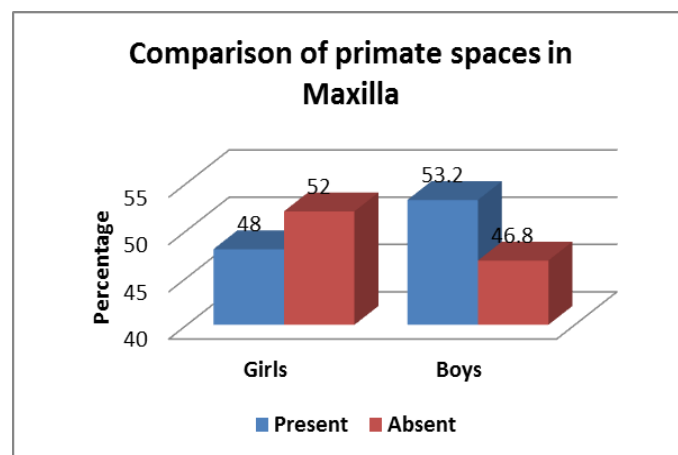
In evaluation of canine relationship, there is statistically significant difference in the type of canine relation between boys and girls (p=0.014). The most common in both genders were bilateral class I (41.9% - girls , 44% - boys), least common was Class I +Class III in girls (2.3%) and Bilateral class III in boys (3.6%).

Graph 2: Comparison of canine relationship



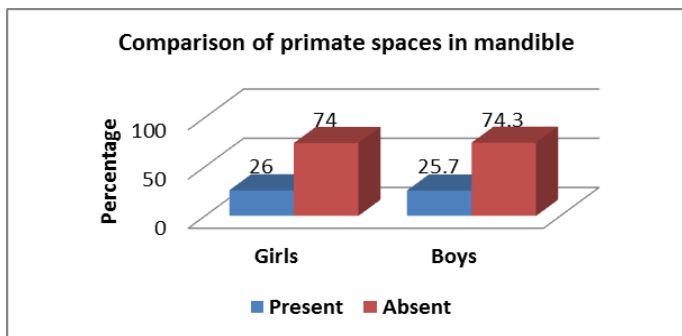
There is statistically significant difference of primate spaces present in maxilla in boys with p value 0.006.

Graph 3: Comparison of primate spaces in maxilla.



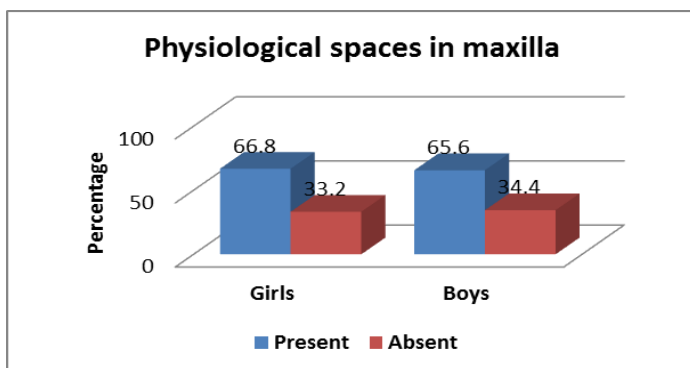
There is no statistically significant difference present in the presence of primate spaces in mandible with higher primate spaces present in boys. (p=0.844).

Graph 4: Comparison of primate spaces in mandible



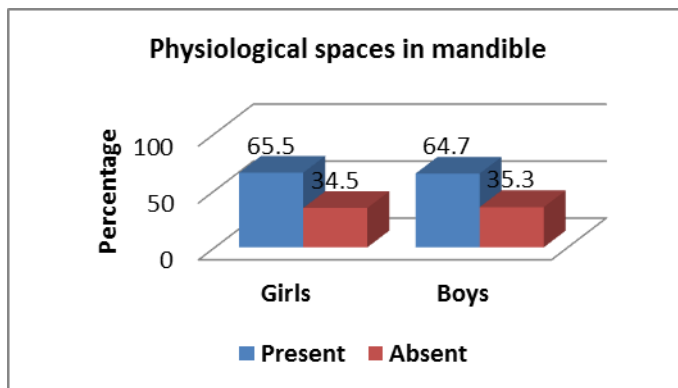
There is no statistically significant difference present in the present of physiological spaces of boys in both genders ( $p=0.773$ ) There is no statistically significant difference in girls between present and absent of physiological spaces in maxilla. There is no statistically significant difference in boys between present and absent of physiological spaces in maxilla.

Graph 5: Physiological spaces in maxilla



There is no statistically significant difference in the presence of physiological spaces in mandible in both genders ( $p=0.329$ ) .There is no statistically significant difference in girls between present and absent of physiological spaces in mandible. There is no statistically significant difference in boys between present and absent of physiological spaces in mandible.

Graph 6 : Physiological spaces in mandible



### Discussion

This descriptive cross-sectional survey was based on clinical examination of the primary dentition of 2797 school children aged 3-5 years from total 52 private school using stratified cluster random sampling method. All the school children were screened for spaced and non-spaced dentition, primary molar relationship and canine relationship. In the present study the most common occlusion in both genders were bilateral flush terminal plane (55.1% - girls , 57.8% - boys), followed by bilateral mesial step (18.8% in girls and 18.4% in boys), flush terminal plane + mesial step (14.8% in girls and 15.3% in boys), flush terminal palne + distal step (4.9% in girls and 3.6% in boys), bilateral distal step (3.8% in girls and 3.4% in boys), least common occlusion was unilateral mesial step and unilateral distal step (2.6% - girls, 1.5% - boys). No significant differences were found between boys and girls in primary molar relationship. The finding of this study correlated with the following studies: **Sriram CH et al (2012)**<sup>13</sup> in Chennai and Hyderabad showed that the majority of the children in the sample (74% in Chennai group and 72.5% in Hyderabad group) had a bilateral flush terminal plane relationship followed by bilateral mesial step (12.4% in Chennai group and 14.1% in Hyderabad group) and bilateral distal step (3.3% in Chennai group and 4.5% in Hyderabad group). **Shavi GR et al (2015)**<sup>14</sup> examined 945 children and observed that

flush terminal molar relation had highest of 65% prevalence followed by mesial step 31%, and distal step 4%. **Baidas L** (2010)<sup>15</sup> in Saudi and **Bhatt SS et al** (2012)<sup>16</sup> in mangalore conducted studies in children of age group 3-5 years and found that 75 % and 67.9% of the children respectively had highest prevalence of flush terminal which was also in accordance with the present study. **Bhaya DP et al** (2012)<sup>17</sup> in Bhagalkot also found that the highest prevalence of occlusal characteristic was flush terminal plane with 52.5%. **Vegesna M et al** (2014)<sup>18</sup> in Andhra Pradesh conducted study on Dravidian children 3-6 year old found flush terminal plane molar relation 80.3% was the most common primary relation. **Khan R et al** (2014)<sup>19</sup> conducted a study in 3 to 6 years age group in lucknow and the result showed that 62.3% had flush terminal plane, 31.3% mesial step and 6.4% distal step molar relationship.

In evaluation of canine relationship 43% had bilateral class I, 22.4% had bilateral class II and 3.2% had bilateral class III canine relation. 44% boys had bilateral class I canine relation in comparison to 41.9% of girls which is stastically significant ( $p=0.014$ ). The present study correlated with the studies of **Yilmaz Y et al** (2006)<sup>20</sup> examined 205 children of 3-6 year old Turkish children and observed that class I was represented by (87.8%) followed by class II (7.8%), class III (4.4%). **Baidas L** (2010)<sup>15</sup> examined 323 kindergarten children aged 3-5 year old and reported that the canine relationship was class I in 90.1% followed by class III 7.4% and class II 2.5% relationship. In evaluation of unilateral combination canine relationship of class I, class II, class III, the present study had 22.3% of unilateral class I and class II, 5.2% of unilateral class I and class III, 3.2% of unilateral class II and class III which was consistent with the study done by **Madhuri vegesna et al** (2014)<sup>18</sup> who also found similar result as that of present study.

While evaluation of primate space 53.2% of boys and 48% of the girls had primate space in maxilla. 46.8% of the boys and 52% of the girls had no primate space in maxilla. In mandible 25.7% boys and 26% of the girls had primate space. 74.2% of total children had no primate space in mandible. Total 50.8% of population had primate space in maxilla and 25.8% of the population had primate space in mandible which is statistically significant with p value ( $p<0.001$ ). This present study is consistent with the study done by **Ferreira et al** (2011)<sup>21</sup> who observed that frequency of primate space was higher in maxillary arch than in mandibular arch. **Bhaya DP et al** (2012)<sup>17</sup> in Bagalkot city, who observed that the presence of primate space were 47.6% in maxilla while the 25.8% of population had primate space in mandible and **Lochib S et al** (2014)<sup>22</sup> observed that the presence of primate spaces were 61.7% in maxilla and 27.9% in mandibular arch which was consistent with the present study. In the present study mandible primate spaces in girls and boys were 26% and 25.7% respectively, with no stastically significant difference between both the sexes, was consistent with study done by **Mahmoodian J et al** (2004)<sup>23</sup>.

The evaluation of physiological space in the present study, it was found that 65.6% of boys children and 66.8% of the girls children had physiological spaces in maxilla. 34.4% of the boys and 33.2% of the girls had no physiological space. In mandible 64.7% boys and 65.5% of the girls children had physiological space & 35.3% of boys and 34.5% of the girls had no physiological space in mandible. Total 66.1% of population had physiological space in maxilla and 65.1% of the population had physiological space in mandible which is stastically not significant with p value ( $p>0.05$ ). Present study is consistent with the study done by **Khan R et al** (2014)<sup>19</sup> in Lucknow who also found similar result regarding physiological space in maxilla and mandible. The present

study offers insight into the occlusal pattern, physiological spacing, primate spaces, canine relationship in the primary dentition among pre- school children of Darbhanga district of Bihar. Presently, the results show a highest prevalence of bilateral flush terminal plane molar relationship which has more tendency for class I molar relationship in permanent dentition, bilateral class I canine relationship, highest frequency of primate spaces in both boys and girls in maxilla indicates sufficient space available for the eruption of permanent teeth in the normal occlusion and physiological spaces in both arches. Further studies are required to identify the probable limitations of the clinical approach relying on early orthodontic diagnosis and intervention

### Conclusion

- When the primary molar relation between boys and girls where compared, the most common prevalence was bilateral flush terminal plane and least common was one side mesial step and another side distal step.
- When the primary canine relation between boys and girls where compared, The most common prevalence was bilateral class I was most common and least common was one side class I and another side class III and Bilateral class III in boys.
- The presence of the primate space in the deciduous dentition was more common, with its high frequency in the upper arch, and a similar result was observed in both boys and girls.
- In the present study the presence of physiological spaces in deciduous dentition of both arches was most common.

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