EJPMR, 2026, 13(1), 314-320 **Research Article** **Impact Factor 7.065**

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

ISSN (O): 2394-3211
ISSN (P): 3051-2573
Coden USA: EJPMAG

PREVALENCE OF OCCLUSAL TRAITS IN PRESCHOOLER'S OF 3-5 YEARS OLD OF NAMAKKAL DISTRICT TAMIL NADU: A CROSS- SECTIONAL STUDY

[1]*Dr. Kamatchi Mohanraj, [2]Dr. Aishwaryaa Kandhan, [3]Dr. Vinodh Selvaraj, [4]Dr. Gawtaman M., [5]Dr. Manoharan Muthusamy, [6]Dr. Vijayakumar

[1,2,3,4,5]Department of Paediatric Dentistry, Vivekanandha Dental College for Women.

***Corresponding Author: Dr. Kamatchi Mohanraj**

Department of Paediatric Dentistry, Vivekanandha Dental College for Women.

DOI: https://doi.org/10.5281/zenodo.18093982

How to cite this Article: *[1]Dr. Kamatchi Mohanraj, [2]Dr. Aishwaryaa Kandhan, [3]Dr. Vinodh Selvaraj, [4]Dr. Gawtaman M., [5]Dr. Manoharan Muthusamy, [6]Dr. Vijayakumar (2026). Prevalence Of Occlusal Traits In Preschooler's Of 3-5 Years Old Of Namakkal District Tamil Nadu: A Cross- Sectional Study. European Journal of Pharmaceutical and Medical Research, 13(1), 314–320.

Article Received on 04/12/2025 **Article Revised on 25/12/2025** **Article Published on 01/01/2026**

ABSTRACT

Aims & Background: Understanding the occlusal relationship of the primary dentition is crucial for pediatric dentists because it allows for the early prediction of any malocclusions in the permanent dentition and the appropriate use of orthodontic treatments to correct them. The aim of this study is to assess the prevalence of occlusal characteristics of primary dentition in 3 – 5 years old school children, of Namakkal district. **Materials & Methods:** A multistage sample strategy was used to perform a cross-sectional survey among 500 children who attended schools of Namakkal district, aged 3 – 5 years old. The study group was evaluated for the various occlusal characteristic's that include primary molar relation, canine relation, overjet, overbite, open bite, primate spaces, physiologic spacing and crowding. Data were collected & tabulated to carry out statistical analysis. **Results:** Out of the total 529 children examined, mesial step molar relationship was found to be 57%, distal step in 4% & flush terminal plane in 39%. Class I canine relationship was seen in 90%, class II in 4% & class III in 2%. Physiologic spacing was found in 40% in maxilla and 38% in mandible. **Conclusion:** The findings indicate that the study population demonstrates a relatively low incidence of deviations from normal occlusion, implying a diminished risk for the development of malocclusion in the permanent dentition.

KEYWORDS: Canine relationship, Molar relationship, Occlusion, Occlusal characteristics, Primary dentition.

INTRODUCTION

Malocclusion is listed second in prevalence among dental conditions affecting children and young adults, second only to dental caries.[1] Beyond its implications for oral health, functionality, and aesthetics, malocclusion—as perceived by the individual—can have a considerable psychological impact, influencing self-esteem and overall quality of life.[2] Pediatric dentistry is a specialized field committed to the prevention, diagnosis, and management of oral diseases in infants, children, and adolescents. Its primary objective is to promote and maintain optimal oral health beginning with the emergence of the first deciduous tooth and continuing through the development of a stable and functional permanent dentition. Pattern of spacing and occlusal traits in deciduous dentition is essential for guiding the proper alignment and occlusion of the permanent teeth.[3] Hence, a comprehensive knowledge of primary dentition occlusion is crucial for dental practitioners in order to predict, identify, and manage potential malocclusions at an early stage through timely orthodontic intervention.[4]

A comprehensive knowledge of the anteroposterior developments during the shift from primary to permanent teeth is crucial for professionals in early orthodontics. Notably, Bouge (1908) emphasized that occlusal irregularities present in the primary dentition are frequently maintained in a similar form in the permanent dentition.[5]

Epidemiological research is vital for evaluating the oral health profile of populations and for monitoring occlusal development throughout the various stages of childhood. However, there remains a significant lack of data in deciduous dentition regarding occlusal features in the

Indian context, as existing literature has primarily addressed children aged six and above.[6] Given the limited literature available on the primary occlusal traits among school-aged children in the Namakkal demography, this research was undertaken to assess the prevalence rate and distribution of occlusal characteristics in the primary dentition of presschooler's.

It is hypothesized that variations exist in the prevalence and distribution of occlusal characteristics among preschool children aged 3–6 years in the Namakkal district, Tamil Nadu. Specifically, differences are expected in molar and canine relationships, spacing patterns, and occlusal traits such as overjet, overbite, open bite, crossbite, and crowding between male and female children.

MATERIALS AND METHODS

A Cross-sectional study was performed across pre-schooler's of 3–6 years from Namakkal district, Tamilnadu. Ethical approval was secured from Institutional Review Board (VDCW/IEC/349/2023). Sample size was calculated with confidence level 95%, Prevalence – 46% & the acceptable margin of error was set at 0.05. The Minimum sample size was 381 and the total sample size was approximated to 500.

A random sample was drawn from schools, including both private institutions and government (Anganwadis), randomization was done by chit method. Permission was granted by school authorities, and the Head of the Institution informed the parents, from whom consent was obtained. ADA type IV clinical examination[7] was conducted using natural light performed by a single examiner.

The following criteria's were included in this study.

- Children with no early tooth loss,
- Teeth devoid of carious,
- Children whose parents provided written consent,
- Cooperative children according to Frankl's behavior-rating scale (3&4)

Data were collected for subsequent parameters.

1. Occlusal relationship of primary molars

Baume[8] classified the primary molar relationship as follows.

I. Flush Terminal plane: Distal aspects of mandibular as well as maxillary deciduous 2nd molars coincide within a common vertical plane.
II. Mesial step: Distal aspect of mandibular primary 2nd molar lies mesial to the maxillary primary second molar.
III. Distal step: Primary mandibular 2nd molar lies distal to primary maxillary second molar at the distal surface.

2. Primary canine relationship (Foster & Hamilton[9], Farsi & Salama[10])

I. Class I: The cuspal tip of maxillary primary canine aligns vertically with the distal surface of the mandibular primary canine.
II. Class II: Primary upper canine cusp tip is located mesially in relation to the distal aspect of primary lower canine.
III. Class III: The cuspal tip of the upper primary canine is located distal to the distal aspect of the lower primary canine.

3. Spacing

Baume[8] categorized primary dentition as non-spaced or spaced. In spaced dentition there are,

I. Primate spaces: Spaces identified distal to the canine in lower arch and mesial to canine in upper arch.
II. Physiologic spaces: Spaces prevailing between primary teeth which are generalized.

4. Overjet

Overjet was measured from the most protruded upper incisor's palatal surface to the labial surface of the lower incisor using a divider and scale. Values above 3 mm were considered increased.[11]

5. Overbite

Overbite was measured by maxillary incisor coverage over mandibular incisors, considered increased if >3 mm.[11]

6. Open bite

Absence of vertical overlap between the incisal edges of maxillary and mandibular incisors.[12]

7. Anterior crossbite

Maxillary incisors or canines lies in lingual relation to mandibular incisors or canines.[12]

8. Posterior crossbite

When upper molars occludes lingually to the lower molars.[12]

9. Crowding

When lack of space in a segment led to overlapping of erupted teeth.[12]

STATISTICAL ANALYSIS

The obtained data was subjected to statistical analysis using SPSS Version 25, IBM Statistics, and USA.

- Shapiro-wilk's test was done to assess normality of data
- Description of data was done using frequency & distribution
- Significance level was considered as 5% ($p < 0.05$ Statistically Significant).

RESULTS

The current research examined primary malocclusion in 500 school children aged 3 to 5 years, including 246 males and 254 females.

Table 1: Distribution of occlusal characteristics in studied population.

		FEMALE	MALE	P value
Molar relationship – Right side – mesial step	Absent	97	118	0.027
	Present	157	128	
R – Distal step	Absent	244	234	0.237
	Present	10	12	
R – Flush terminal	Absent	165	140	0.065
	Present	89	106	
Molar relationship – Left side – Mesial step	Absent	100	122	0.021
	Present	154	124	
L – Distal step	Absent	246	236	0.583
	Present	8	10	
L – Flush terminal	Absent	162	136	0.053
	Present	92	110	
Canine relation – Right side – class 1	Absent	28	20	0.272
	Present	226	226	
R – class 2	Absent	226	234	0.011
	Present	28	12	
R – class 3	Absent	254	238	0.004
	Present	0	8	
Canine – Left side – class 1	Absent	24	23	0.970
	Present	230	223	
L – class 2	Absent	230	234	0.048
	Present	24	12	
L – class 3	Absent	254	240	0.012
	Present	0	6	
Overjet	Absent	201	177	0.062
	Present	53	69	
Overbite	Absent	198	173	0.051
	Present	56	73	
Openbite	Absent	244	230	0.196
	Present	10	16	
Crossbite - anterior	Absent	247	238	0.745
	Present	7	8	
Crossbite - posterior	Absent	254	244	0.150
	Present	0	2	
Primate spaces - upper	Absent	105	67	0.001
	Present	149	179	
Lower	Absent	140	118	0.110
	Present	114	128	
Phy spaces - upper	Absent	156	142	0.400
	Present	98	104	
Lower	Absent	162	145	0.267
	Present	92	101	
Crowding upper	Absent	254	246	0.341
	Present	0	0	
Lower	Absent	232	230	0.363
	Present	22	16	

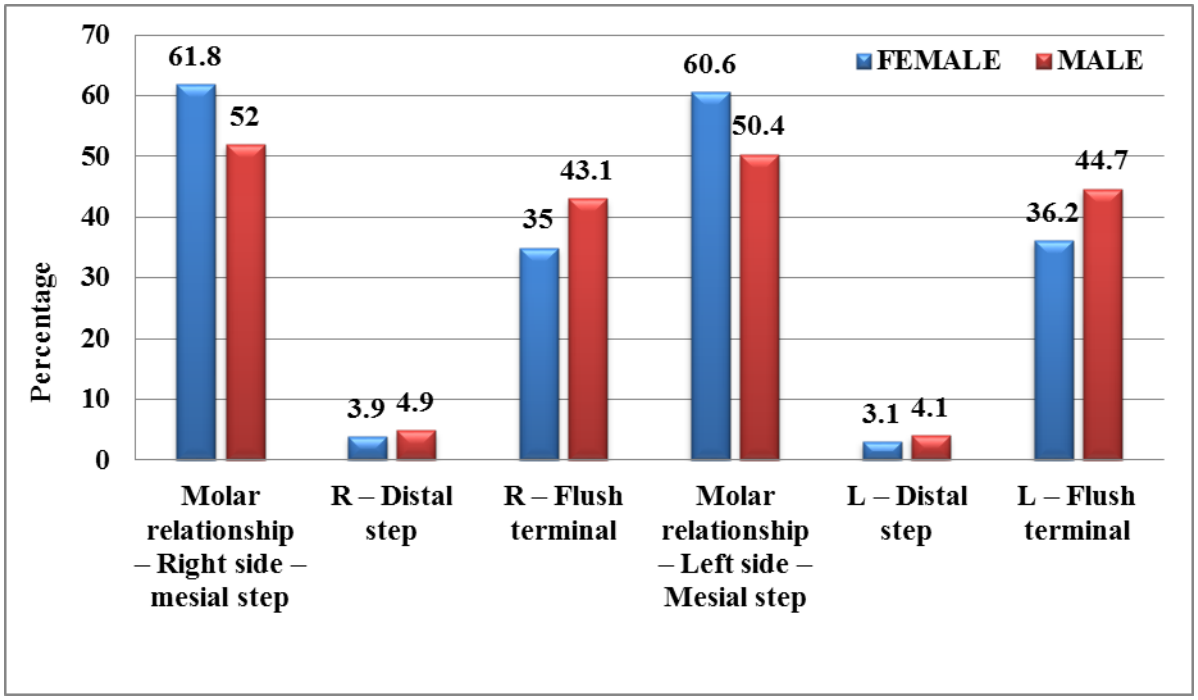

Fig. 1: Molar relationship in primary dentition.

Figure 1 & Table 1 illustrates the distribution of primary molar alignment among male & female children on both sides. On the left side, male children exhibited a flush terminal plane in 44.7%, a mesial step in 50.4% & a distal step in 4.1%. In female children, the, distal step, mesial step & flush terminal plane was observed in 3.1%, 60.6% and 36.2% respectively. On the right side, flush terminal plane in 43.1%, mesial step in 52%, and distal step in 4.9% was exhibited by boys, while in female children; these values were 35% for flush terminal plane, 61.8% for mesial step, and 3.9% for distal step. On the left side significant difference amongst male and female children was noted in the mesial step molar relationship.

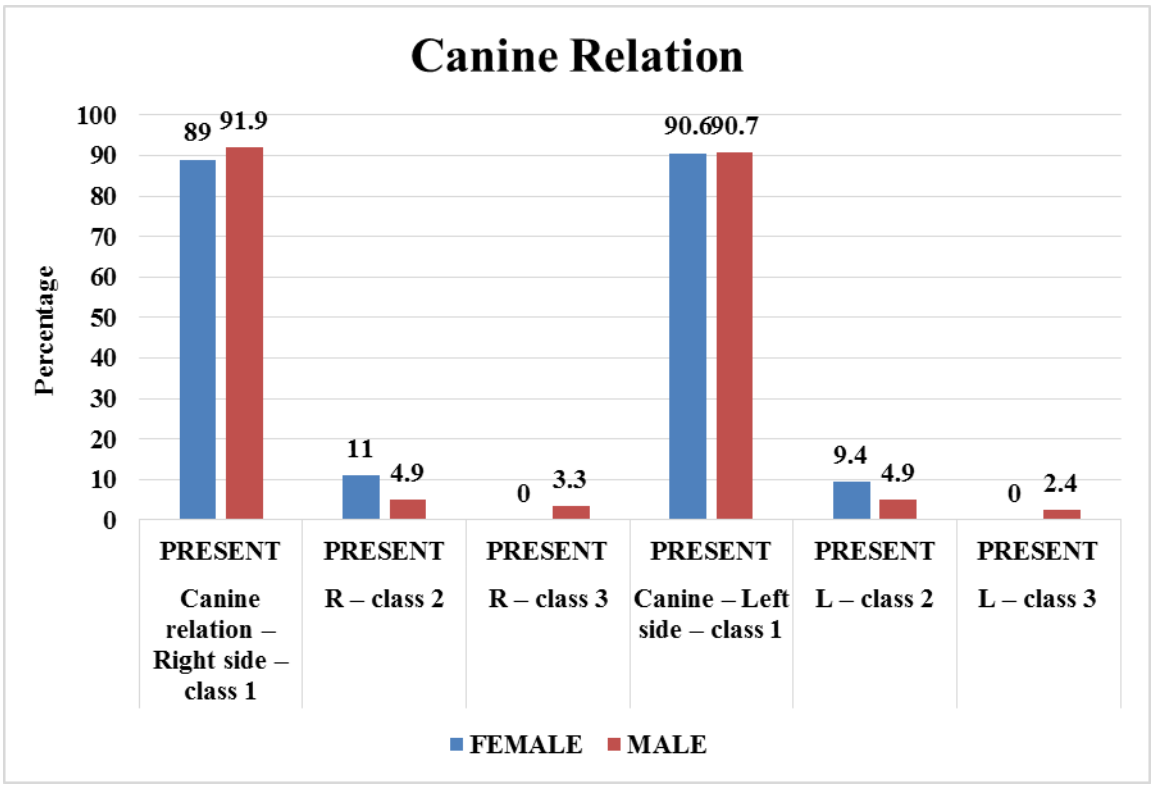

Fig. 2: Canine relationship in primary dentition.

Figure 2 & Table 1 presents a assessment of primary canine relationships between male & female children. Male children exhibited Class I in 90.7%, Class II in 9.4% & Class III in 2.4% and female children, in which 90.6% demonstrated Class I, 11% Class II & none showed a Class III canine relationship in the left side. On right side, male children showed Class I in 91.9%, Class II in 4.9% & Class III in 3.3%, while female children demonstrated Class I in 89%, Class II in 11% & again, no occurrence of Class III canine relationship was observed. Statistical differences were noted between male and female children in both Class II & Class III primary canine relationship.

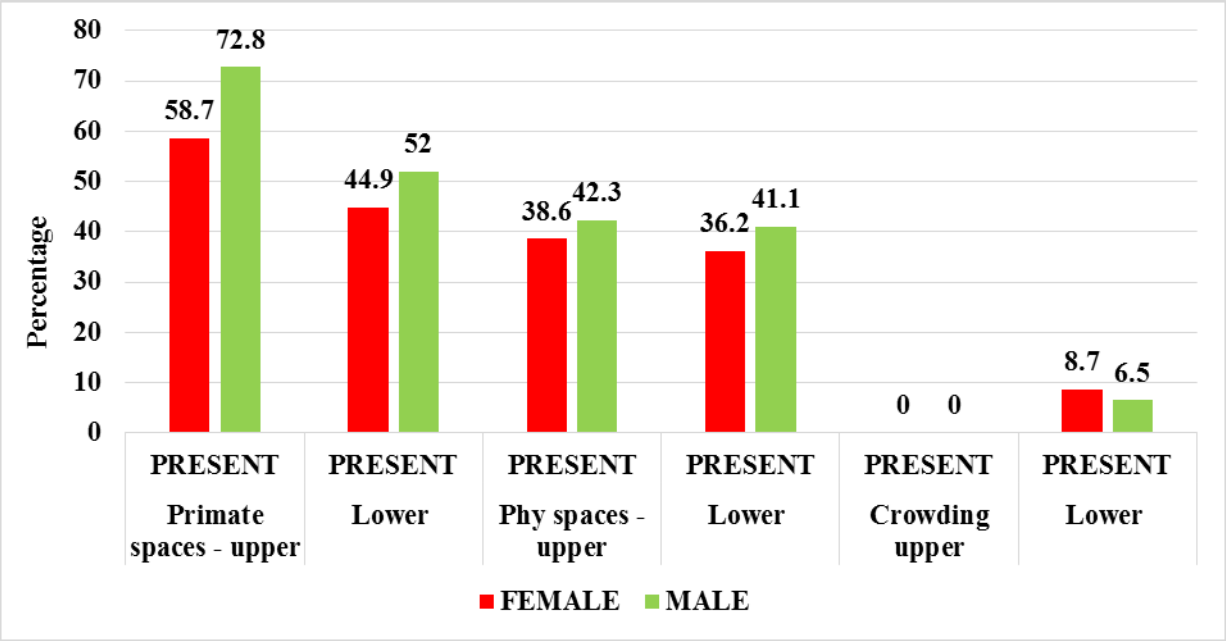

Fig. 3: Spacing in primary dentition.

Figure 3 & Table 1 Illustrates spacing patterns in the dentition. Primate spaces were observed in the upper arch in 58.7% of girls and 72.8% of boys, while in the lower arch, 44.9% of girls and 52% of boys exhibited such spacing. Physiologic spaces were noted in 38.6% of girls and 42.3% of boys in the upper arch, and in 36.2% of girls and 41.1% of boys in the lower arch. Crowding in the lower arch was identified in 8.7% of girls and 6.5% of boys.

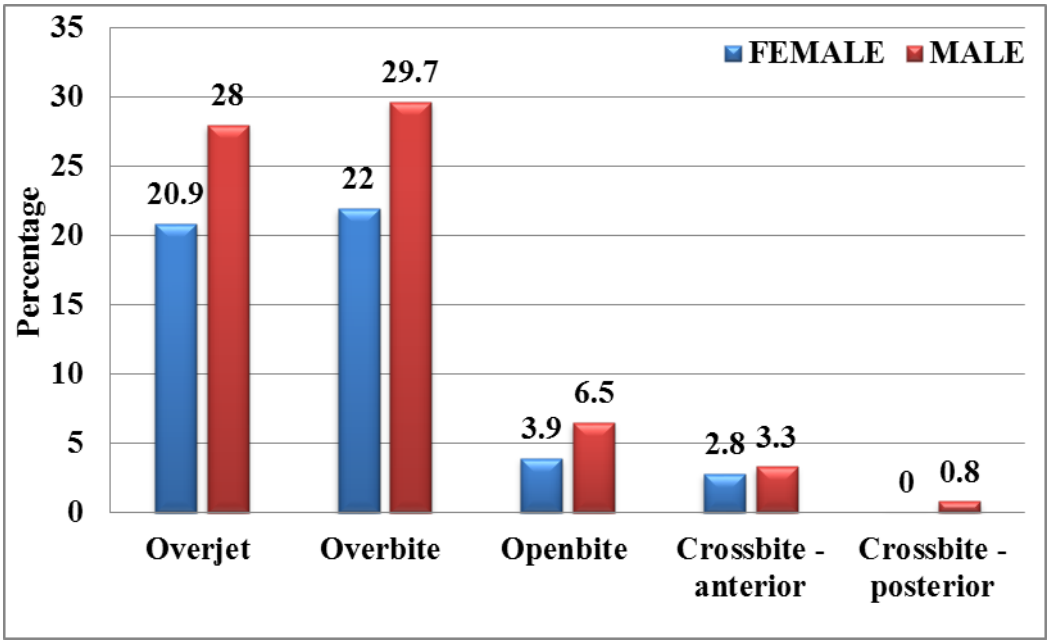

Fig. 4: Distribution of other occlusal characteristics in primary dentition.

Figure 4 & Table 1 depicts the prevalence of various occlusal traits. Overjet was observed in 20.9% of girls & 28% in boys, while open bite was evident in 3.9% of girls and 6.5% of boys. Overbite was noted in 22% of girls and 29.7% of boys. Anterior crossbite was identified in 2.8% of girls and 3.3% of boys, whereas posterior crossbite was found exclusively in 0.8% of boys.

DISCUSSION

It is imperative to identify predisposing factors of primary teeth that influence occurrence of malocclusion in the permanent teeth. The transition from primary to permanent dentition, accompanied by occlusal discrepancies, has highlighted the critical influence of deciduous dentition in guiding proper alignment of permanent teeth & in the establishment of a functional as well as stable occlusion.

A variety of epidemiological researches have documented the traits of primary dentition among diverse demographics.Such studies are of significant importance, as they highlight the necessity for corrective and interceptive orthodontic interventions. The paucity of comparable statistical data pertaining to the Indian population, particularly in the Namakkal district, served as the impetus for undertaking this study.

The mesial step had greater occurence in females compared to males on both right (61.8% & 52%) and left sides (60.6% & 50.4%), suggesting a greater likelihood of transitioning in permanent teeth to Angles class I molar occlusion. In contrast, no significant differences were noted for distal step prevalence between females and males on either side, indicating a low probability of developing Class II malocclusion in both genders. Although flush terminal plane was slightly increased in males than females on both sides, the differences were not statistically significant, reflecting a similar likelihood of transitioning to Angle's Class II or Angle's Class I molar relationships depending on mandibular growth patterns. Multiple studies undertaken in pediatric population of comparable age have demonstrated a tendency toward a predominantly mesial step molar relationship, whereas the distal step was observed with the lowest frequency.[3, 5, 13] This result differs from the findings of Yilmaz et al.,[14] found that the flush terminal plane relationship was evident in 88.29% of Turkish children between the ages of 3 and 6.

Class I canine relationship prevalence did not differ significantly whwn observed between the right and left sides between females and males, indicating a balanced occlusion in both genders. However, Class II canine relationships were significantly more prevalent in females compared to males on both sides, suggesting a higher likelihood of developing Class II malocclusion. Female participants showed no evidence of Class III canine relationships but it was present in males (3.3% on the right and 2.4% on the left), with highly significant differences, indicating a greater predisposition to skeletal discrepancies in males. Similar studies have reported varying prevalences of Class I canine relationships Farsi et al[10] found 57%, Otuyemi et al[5] reported 74.5%, and Yilmaz et al[14] documented an even higher prevalence of 87.8%. Contrary to the results observed in the present study, the investigation by Kumar D[3] reported a predominance of Class III relationships (61%), with Class II and Class I relationships reported in 12% & 27% of cases, respectively.

In this research upper arch, had a significantly higher prevalence of primate spaces was observed in males (72.8%) compared to females (58.7%), with a highly significant difference, while most of children exhibited spacing upper anteriors only. These spaces facilitate the transition to permanent dentition by providing adequate room for the increased mesiodistal width of erupting permanent teeth. As also noted in the study by Otuyemi et al[5] the area mesial to the maxillary canines was the most predominant location for spacing. Conversely, in the mandibular arch, the difference in spacing between females (44.9%) and males (52%) was not statistically significant.

In upper arch, the prevalence of physiological spaces did not differ significantly between females (38.6%) and males (42.3%). Similarly, in the lower arch, the difference was not statistically significant between females (36.2%) and males (41.1%). Observance of physiologic spaces & primate was comparable between Hegde S.[15] and Shavi GR.[16] who studies north and South Indian populations.

Crowding in the upper arch was observed in 3.9% of females and 2.4% of males, with no statistically significant difference.

No statistical differences were observed in the upper arch between 3.9% females & 2.4% of males. Similarly, in lower arch, the distribution of crowding was comparable in females (8.7%) and males (6.5%), indicating analogous space-related concerns in both genders which leads to insufficient space for permanent teeth, potentially requiring orthodontic management. Unlike the present study, Hegde S.[15] documented a notably higher prevalence rate of 26.5%.

In males, increased overjet was observed at a prevalence of 28% compared to 20.9% in females; however, this difference was not statistically significant. An increased overjet is frequently observed in Class II malocclusion and may result in concerns related to both function and aesthetics. Whereas studies done by Vegesna et al.[17] and Fernandes S.[12] reported much lower prevalence of overjet. Similarly, increased overbite was more prevalent in males (29.7%) than in females (22%), but this difference was also not statistically significant. Excessive overbite may contribute to palatal tissue trauma and might warrant interceptive orthodontic care. Openbite

prevalence was similar between females (3.9%) and males (6.5%) and this may be linked to habits such as thumb-sucking or tongue thrusting, with low occurrence in both genders. These results were in accordance to the studies done by Reddy BP[11], Fernandes S[12] &Vegesna M.[17]

Similarly, anterior crossbite was rare, with comparable prevalence between females (2.8%) and males (3.3%). Additionally, posterior crossbite was extremely uncommon, showing no significant difference between females (0%) and males (0.8%).

Current study explores the condition of primary dentition among preschool children which includes occlusal forms, crowding, spacing and crossbite in Namakkal district, Tamil Nadu. According to the present research, malocclusion in the primary dentition is not highly prevalent in this district.

However, extended research is warranted to evaluate potential drawbacks of clinical approaches that depend on earlier orthodontic detection and intervention.

CONCLUSION

To conclude it was observed that mesial step was the most frequent molar relationship & Class I canine relationships was prevelent in both males and females. Of the occlusal traits assessed, overjet and increased overbite were notably common in primary dentition of Namakkal preschooler's. To ascertain if these occlusal traits will translate into optimum occlusion in the permanent teeth, more longitudinal research is necessary.

ACKNOWLEDGEMENT

The authors are highly thankful for the Department of Pedodontics & Preventive Dentistry, Vivekanandha Dental College for Women, Tiruchengode.

REFERENCES

1. Parmesh H, Mathur VP. National Oral Health Care Program. Indian Pediatr, 2002; 39: 1001–1005.
2. Khan A, Patthi B, Singla A, et al. Prevalence of Malocclusion and Its Impact on Oral Health Related Quality of Life (OHRQoL) among 12–15-year-old School-going Children of Modinagar, Ghaziabad. J Oral Health Comm Dent, 2023; 17(3): 90–96.
3. Kumar D, Gurunathan D. Primary Canine and Molar Relationships in Centric Occlusion in 3 to 6-year-old Children: A Cross-sectional Survey. Int J Clin Pediatr Dent, 2019; 12(3): 201–204.
4. Mtaya M, Brudvik P, Åstrøm AN. Prevalence of malocclusion and its associated factors among pre-schoolchildren in Kinondoni and Temeke Districts, Tanzania. Tanzan J Health Res, 2017; 19(2): 1–9.
5. Otuyemi OD, Sote EO, et al. Occlusal relationships and spacing or crowding of teeth in the dentitions of 3–4-year-old Nigerian children. Int J Paediatr Dent, 1997 Sep; 7(3): 155–160.
6. Sharma K, Bihani T, Kumar V. Prevalence of Malocclusion in Primary Dentition in Southeast Part of Haryana, India: A Cross-sectional Study. Int J Clin Pediatr Dent, 2021; 14(6): 757–761.
7. Peter S. Essentials of Public Health Dentistry. 5th ed., Survey procedures in dentistry. India: Arya, 2013; 391.
8. Baume LJ. Physiological tooth migration and its significance for the development of occlusion: I. The biogenetic course of deciduous dentition. J Dent Res, 1950; 29(2): 123–132.
9. Foster TD, Hamilton MC. Occlusion in the primary dentition. Study of children at 2.5 to 3 years age. Br Dent J., 1969; 126(2): 76–79.
10. Farsi NM, Salama FS. Characteristics of primary dentition occlusion in a group of Saudi children. Int J Paediatr Dent, 1996; 6(4): 253–59.
11. Reddy BP, Rani MS, Santosh R, Shailaja AM. Incidence of malocclusion in deciduous dentition of Bangalore South population- India. IJCD, 2010; 1(1): 20-23.
12. Fernandes S, Gordhanbhai Patel D, Ranadheer E, Kalgudi J, Santokì J, Chaudhary S. Occlusal Traits of Primary Dentition among Pre-School Children of Mehsana District, North Gujarat, India. J Clin Diagn Res, 2017 Jan; 11(1): ZC92-ZC96.
13. Bishara SE, Hoppens BJ, Jakobsen JR, Kohout FJ. Changes in the molar relationship between the deciduous and permanent dentitions: A longitudinal study. Am J Orthod Dentofacial Orthop, 1988; 93(1): 19–28.
14. Yilmaz Y, Şimşek S, et al. Primary Canine and Molar Relationships in Centric Occlusion in Three to Six Year-Old Turkish Children: A Cross Sectional Study. J Contemp Dent Pract, 2006 July; 7(3): 59–66.
15. Hegde S, Panwar S, Bolar DR, Sanghavi MB. Characteristics of occlusion in primary dentition of preschool children of Udaipur, India. Eur J Dent, 2012; 6(1): 51 55.
16. Shavi GR, Hiremath NV, Shukla R, Bali PK, Jain SK, Ajagannanavar SL. Prevalence of spaced and non-spaced dentition and occlusal relationship of primary dentition and its relation to malocclusion in school children of Davangere. J Int Oral Health, 2015; 7(9): 75-78.
17. Vegesna M, Chandrasekhar R, Chandrappa V. Occlusal Characteristics and Spacing in Primary Dentition: A Gender Comparative Cross-Sectional Study. Int Sch Res Notices, 2014 Oct 29; 2014: 512680.