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Research Article

Sexual Dimorphism in Prevalence of Physiological Space in Primary Dentition in Indian Population

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Abstract

Aim: The present study was envisaged to determine the physiological space in pre-school children in India.

Designs: The present cross-sectional study was conducted among 448 children aged 3-5 years, of whom 392 met our inclusion criteria. The parents completed the research assessment questionnaire on demographic data. Study model casts of 392 children free from malocclusion were analysed. The analyses included frequencies, t-test and p-significance.

Result: No significant difference between the two genders was observed.

Conclusion: Prevalence of physiological spacing in children is 62.4%.

Keywords: Physiological Space; Primary Dentition; Sexual Dimorphism

Introduction

Occlusion in the primary dentition and its significance in the subsequent permanent dentition have been the subject of discussion for more than a hundred years. Bogue, quoted that if malocclusion was found in the primary dentition, it was to be expected that the same irregularities would occur in the corresponding permanent dentition, only to a more pronounced degree [1-5]. Spaces do not increase with age, nor do they develop in unspaced dentition. Prevalence of spaced dentition varies in different ethnic groups [6-10]. Keeping the above in view, the present study was envisaged to determine the physiological space.

Methodology

The present cross-sectional study was conducted among 448 children aged 3-5 years, of whom 392 met our criteria. All nursery schools (play schools and anganwadis) in and around Lucknow city (India) were listed. The schools were randomly selected from the list and camps were conducted. The children were selected following an oral examination performed under natural daylight using a mouth mirror with a good reflecting surface and a stainless-steel explorer. The parents completed a research assessment questionnaire on demographic data. Informed consent was taken from the parents of all participating children.

The exclusion criteria noted below were considered during this selection process.

1. Children with proximal dental caries
2. Children with a defective marginal ridge
3. Children with a previous history of dental extractions

4. Children having abnormal oral habits
5. Children with acquired/developmental dental deformities

Once the above requirements were met, a full-depth alginate impression of each child's maxillary and mandibular arches was made using stainless steel impression trays. Impressions were washed under running tap water and were disinfected using glutaraldehyde. Study model casts were made. All necessary aseptic measures and barrier techniques were followed throughout the study. Interdental spaces were measured on the cast using a vernier calliper with 0.01 mm accuracy. At first, one of the beaks was seated in the interdental space, if space remained between the teeth; another gouge (beak) was added to the first one until the interdental space became filled with the beak without any pressure on the teeth. The presence or absence of interdental space between posterior teeth and anterior teeth was evaluated.

Statistical Analysis

The data obtained were described using simple frequencies and percentages. To quantify the association between gender, primate space, physiological space and arches, the prevalence ratios (P) were calculated. To verify whether the physiological space and primate space differences occurred between the arches and gender Student 't' test. A significance level of $p<0.05$ was adopted.

Ethical Aspects

This study was approved by the Ethics in Research Committee of Saraswati Dental College, Lucknow, India. The procedures, possible discomforts and risks were fully explained to the children and their parents or guardians and written consent was obtained prior to the investigation.

Results

The present study was conducted to evaluate the prevalence of physiological space among preschool children.

The subjects' ages ranged from 3 to 5 years, with a mean of 4.17 ± 0.90 years. The majority (58.7%) of subjects were males (Table 1, Fig. 1).

For both genders, in the lower arch, the largest number of subjects had no physiological space (0); however, in the upper arch, the largest number of subjects had a physiological space in the range of 0.1-2.99. (Table 2, Fig. 2,3). No significant difference between the two genders was observed for any of the locations (Table 3).

S. No.	Variable	Statistic
1.	Mean Age ± SD (Range)	4.17 ± 0.90 (3 to 5)
2.	Male: Female	230 (58.7%):162 (41.3%)

Table 1: Demographic distribution of study subjects.

S No.	Physiological Space	Male (n=230)		Female (n=162)		Total (n=392)	
		No.	%	No.	%	No.	%
Lower Arch							
1.	0	114	49.6	72	44.4	186	47.4
2.	0.1-2.99	75	32.6	65	40.1	140	35.7
3.	>3	41	17.8	25	15.4	66	16.8
Mean ± SD		0.86 ± 1.98		0.86 ± 1.02		t=-0.030; p=0.976	
Upper Arch							
1.	0	60	26.1	51	31.5	111	28.3
2.	0.1-2.99	91	39.6	57	35.2	148	37.8
3.	>3	79	34.3	54	33.3	133	33.9
Mean ± SD		1.08 ± 0.77		1.02 ± 0.81		t=-0.793; p=0.428	

Table 2: Relationship between physiological spacing and sex.

Location	Males			Females			"t"	"p"
	N	Mean	SD	n	Mean	SD		
Distal Step								
Max Ant	19	0.22	0.52	16	0.69	1.15	-1.582	0.123
Mand-Ant	19	0.21	0.44	16	1.37	2.48	-2.017	0.052
Max Post	19	0.00	0.00	16	0.09	0.36	-1.093	0.282
Mand Post	19	0.00	0.00	16	0.09	0.35	-1.093	0.282
Flush Terminal								
Max Ant	57	0.50	0.81	44	0.46	0.96	0.199	0.843
Mand-Ant	57	0.88	1.76	44	0.65	1.21	0.748	0.456
Max Post	57	0.08	0.29	44	0.04	0.19	0.916	0.362
Mand Post	57	0.00	0.00	44	0.00	0.00	-	-
Mesial Step								
Max Ant	154	1.04	1.30	102	0.78	1.04	1.676	0.095
Mand-Ant	154	1.01	1.32	102	1.10	1.50	-0.512	0.609
Max Post	154	0.07	0.31	102	0.23	0.60	-2.732	0.007
Mand Post	154	0.10	0.43	102	0.09	0.37	0.118	0.906

Table 3: Comparison of mean interdental spacing between males and females at different locations.

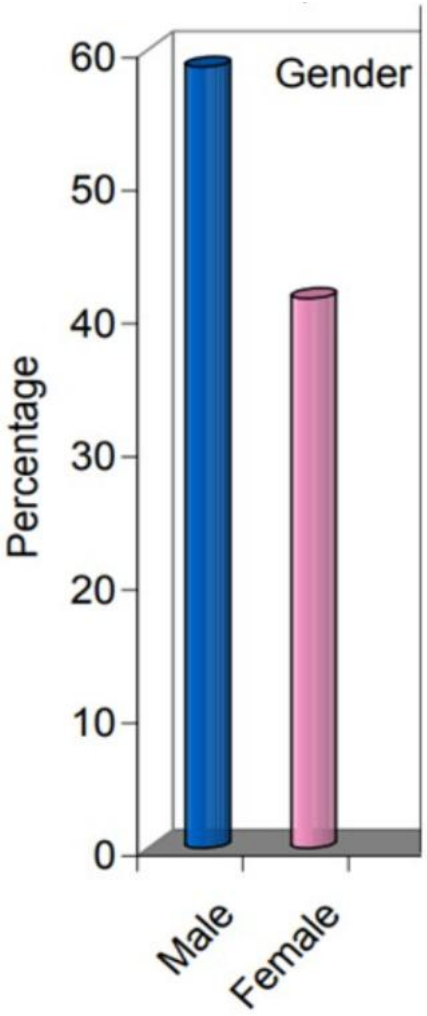

Figure 1: Demographic distribution of study subjects.

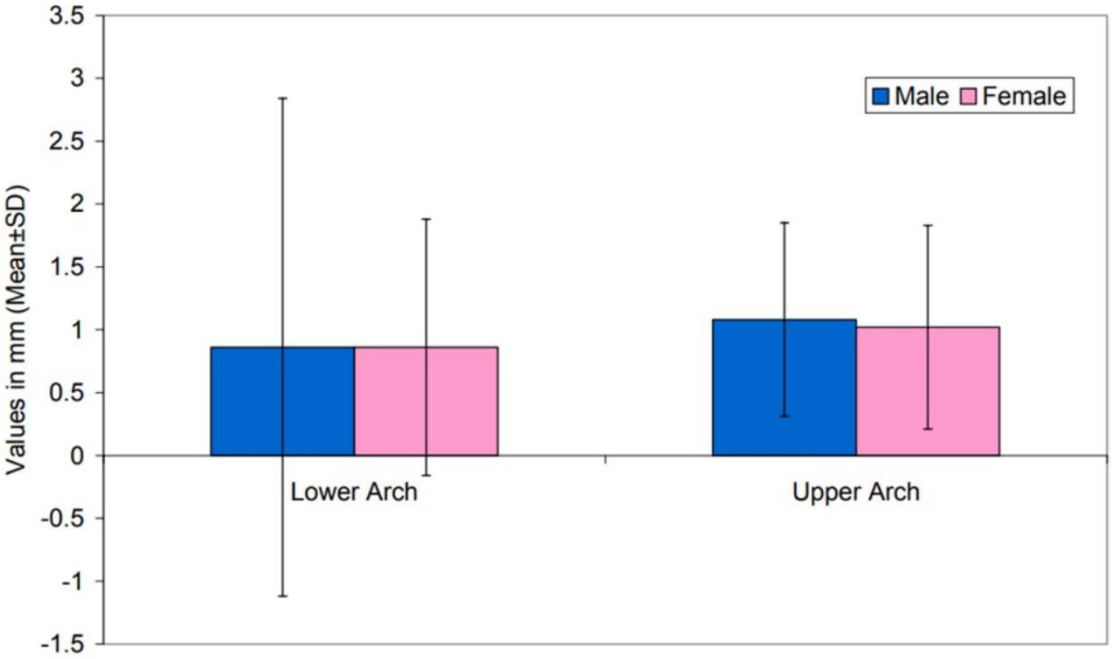

Figure 2: Relationship between physiological spacing and sex.

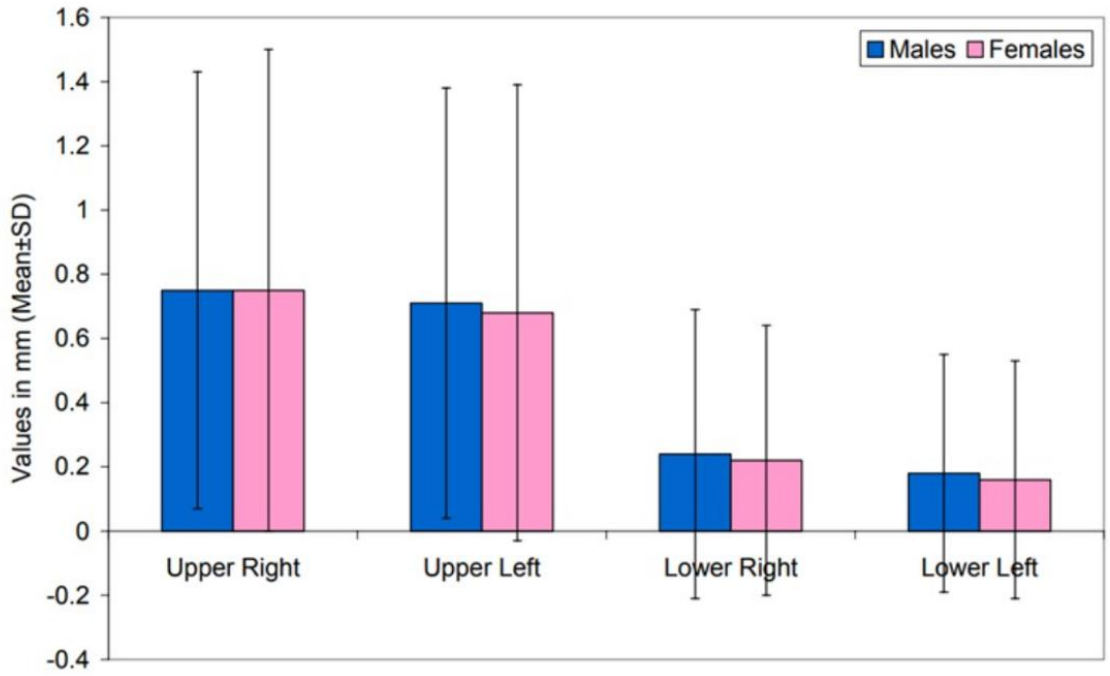

Figure 3: Prevalence of primate spacing of upper and lower arches in males and females.

Discussion

The philosophy of early preventive and interceptive orthodontic treatment is advocated to avoid the need for full-fledged orthodontic treatment at a later stage. India has a high poverty level and therefore preventive orthodontic treatment assumes importance, as orthodontic treatment is expensive and not within the affordable range of the majority of the population. So, assessment of malocclusion at an early age is important. Spacing between primary dentition has been widely documented in the dental literature and is considered an essential feature for normal growth and development [11-13].

The best specimens for a study of arches could be found in the mouth of a 3-to 5-year-old child who is willing to open his mouth wide, long enough to permit oral examination. Usually, all primary teeth erupt by 3 years of age and arch dimensions remain stable during this period.

The findings of our study indicate that the interdental spacing is a common phenomenon of the primary dentition. Kaufman and Koyoumdjisky, in examining 313 preschool children of age 3.5-5.5 years from Israel observed that the prevalence of spaced dentition was 84.2% [14]. Baume, Seipel, Abu Alhaija, Otuyemi and El Nofely all reported in their studies that the prevalence of spaced arches is comparatively higher than that of closed arches [6,15-17]. These are in agreement with our study, in which the prevalence of spaced arches is 62.4%.

No sexual dimorphism was present in frequency of occurrence of spaces between maxillary and mandibular dental arches in the present study (73.9% males - 68.5% females in maxilla and 50.4% males - 55% females in mandible) which was in agreement with Ravn9 who reported that 27% of males and 20.5% of females had spacing between all the teeth in the maxilla. Other studies in agreement were Lavelle, Nġanġa, Otuyemi, Bassler-Zeltamann [14,16,18,19]. Leighton's, hypothesis suggested that there should be 6 mm or more space between mandibular teeth in order for there to be no chance of development of incisor crowding in the permanent dentition [20]. The result in our study demonstrated that 37.6% of the samples had no spacing at all, which showed that these children have a higher probability of developing malocclusion. The probability of development of malocclusion was higher in females than in males (26.1% males and 31.5% females in maxilla; and 26.1% males and 31.5% females in mandible had no spacing). This was similar to a study quoted by Suma [21]. Tooth-to-jaw discrepancy is certainly the most common feature in modern man's dentition. Strong genetic factors and increased environmental influences have been considered significant contributors to the high prevalence of crowding in today's population.

Importance of Paper to Paediatric Dentists

1. Study helps us to know the necessity and extent of preventive and interceptive orthodontics not only for clinical purposes but also for academic reasons
2. Early diagnoses help us to take appropriate measures that can prevent or intercept full-fledged orthodontic treatment in the permanent dentition. Especially in developing countries, where these treatments are very expensive
3. The relationship between primary molar occlusion and interdental space in both genders was studied to understand changes in occlusion

Conclusion

Within the limitations of the current study, the following observations and conclusions can be drawn from the study:

1. Prevalence of physiological spacing in children is 62.4%. On statistical comparison, no significant difference between the two genders was observed
2. For both genders, in the lower arch, the maximum number of subjects did not have physiological space

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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The authors have no acknowledgments to declare.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Ethical Statement

The project did not meet the definition of human subject research under the purview of the IRB according to federal regulations and therefore was exempt.

Informed Consent Statement

Informed consent was taken for this study.

Authors' Contributions

All authors contributed equally to this paper.

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