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Correlation of the Age of Eruption of Teeth with the Body Mass Index among School Children

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ABSTRACT

The timing of tooth eruption is influenced by various factors, especially the nutritional status of the individual. Body Mass Index gives an indication about the nutritional status of the child. Hence this study was done to determine the correlation between the mean age of eruption of permanent teeth and the Body Mass Index among school children in Thiruvananthapuram. A cross sectional study was done among the students of Thiruvananthapuram. Two thousand nine hundred students (males and females) were included in the study. Only those with the documentary proof of their date of birth were included in the study. For statistical purposes, only completed year was taken into consideration. Random sampling was done by selecting the alternate students from the attendance register. The dental examination was made in the adequate light with the aid of a mouth mirror and a probe. The details of eruption were observed and charted according to the Modified System of Federation Dentaire Internationale (Modified F.D.I). There were 1568 males and 1357 females out of the total sample of 2925 children. The mean age of eruption of mandubular central incisors, mandibular lateral incisors, maxillary second premolars and maxillary first molars were found to have statistical significant difference among the different categories of BMI status. Among the different categories of BMI, Underweight children were found to have late eruption of teeth compared to overweight children.

Keywords: *Mean age of eruption, Permanent Teeth, Body Mass Index*

INTRODUCTION

Assessment of age is often required while administering justice to an individual involved in civil and criminal litigation. A documentary evidence regarding the age of a person is required by the law enforcing agencies in matters like criminal responsibilities, identification, judicial punishment, consent, rape, criminal abortion, employment, attainment of majority, kidnapping and prostitution.[1]Teeth are the most indestructible part of the body and exhibit the least turnover of natural structure, and do need special dissection. Hence teeth provide excellent material in living and non living populations for anthropological, genetic, odontological and forensic investigations.[2] The clinical method to assess dental age is based on the emergence of teeth in mouth. The timing of tooth eruption is influenced by various factors: physiological factors (i.e. heredity, constitution, geographical factors, sex, race, nutrition, climate, urbanisation), pathological systemic factors (various diseases i.e. endocrine diseases, cerebral palsy, severe intoxications, severe renal diseases, genetic disorders) and pathological local factors (local eruption obstacles, hypodontia, lack of space). [3] Demirjian stated that emergence standards should be derived from the population in which they are to be applied, as factors related to emergence may vary considerably.[4]

Very few studies have been published correlating body mass index (BMI) and chronology of tooth eruption among children in India.

Therefore the objective of the present study was to determine the mean eruption time of permanent teeth

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and to compare the relationship of mean eruption time with BMI of school children in Thiruvananthapuram.

MATERIALS AND METHOD

A cross sectional study was done among the students of three different schools from rural, semiurban and urban areas of Thiruvananthapuram. 2925 students (1568 males and 1357 females) were included in the study. Only those with the documentary proof of their date of birth were included in the study. The study was conducted with the approval letter from the Institutional Ethical Committee, Governmental Medical College, Thiruvananthapuram and the Principals of the schools where survey was done. Students who did not have the documentary proof of date of birth and those who were not willing to participate were excluded from the study. For statistical purposes, only completed year was taken into consideration. Random sampling was done by selecting the alternate students from the attendance register. The dental examination was made in the adequate light with the aid of a mouth mirror and a probe. The details of eruption were observed and charted according to the Modified System of Federation Dentaire Internationale (Modified F.D.I).

The age distribution of the samples was found. The percentage of different teeth erupted at different ages was analysed separately for boys and girls to determine the mean age of eruption of individual tooth. BMI was calculated where height and weight of the individual child were measured using height chart and weighing machine.

BMI for age percentiles = weight in kilograms/ height in meter^2.

Underweight was defined as BMI-for-age <5th percentile.

Normal weight was defined as 5th≤BMI for age <85th percentile.

At the risk of overweight was defined as 85th ≤BMI for age <95th percentile.

Overweight was defined as BMI for age ≥95th percentile.

https://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html.

ANOVA, *t*-test were used for statistical analysis in SPSS version 17.0. $P \leq 0.05$ was considered statistical significance.

FINDINGS

Distribution of study population among males and females is shown in Figure 1.

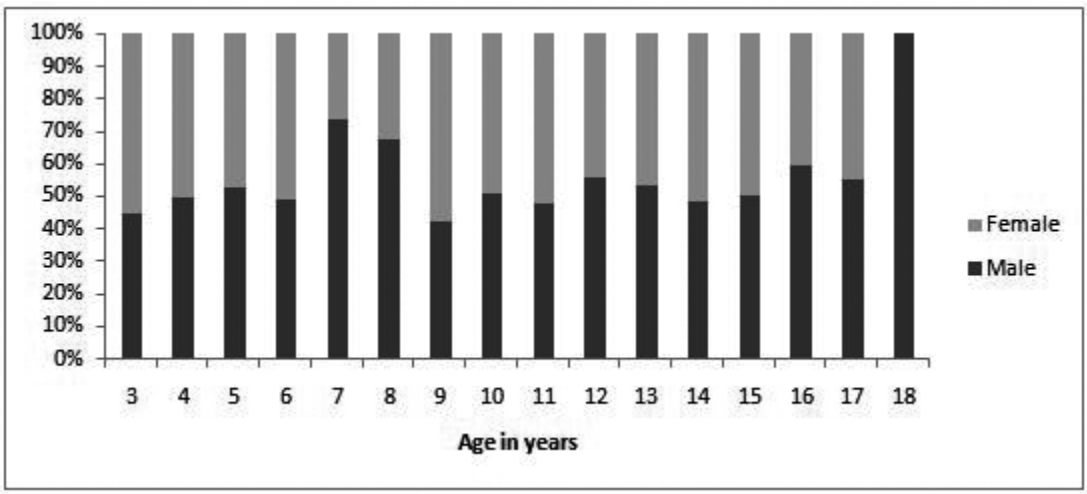

Figure 1

The study subjects were categorized according to BMI scores as underweight, normal weight, at risk of overweight and overweight children. (Table 1)

Table 1

BMI	SEX				Total	
	Male		Female			
	N	%	N	%	N	%
Underweight	300	19.1	203	15.0	503	17.2
Normal weight	1038	66.2	989	72.9	2027	69.3
At the risk of overweight	148	9.4	107	7.9	255	8.7
Overweight	82	5.2	58	4.3	140	4.8
Total	1568	100.0	1357	100.0	2925	100.0

The mean age of eruption (and standard deviation) were obtained and compared with different BMI groups. (Table 2)

Table 2

Age of eruption in years	BMI								p
	Underweight		Normal weight		At the risk of overweight		Overweight		
	mean	sd	mean	sd	mean	sd	mean	sd	
Maxillary central incisor	7.20	0.73	6.96	0.60	6.80	0.39	6.83	0.87	.196
Mandibular central incisor	6.65	0.99	6.46	0.65	6.16	0.66	5.91	0.72	.016
Maxillary lateral incisor	8.19	0.86	7.99	0.92	7.89	0.98	7.94	0.48	.711
Mandibular lateral incisor	7.49	0.85	7.15	0.66	7.62	0.97	7.26	0.92	.043
Maxillary canine	10.54	0.86	10.57	1.07	11.03	1.14	10.83	0.71	.470
Mandibular canine	10.27	0.91	10.16	0.80	10.80	1.52	10.10	0.57	.165
Maxillary first premolar	9.84	0.89	9.74	1.12	10.48	1.45	9.88	0.50	.191
Mandibular first premolar	10.30	0.75	10.33	0.76	10.67	1.79	10.30	0.64	.722
Maxillary second premolar	10.66	0.76	10.40	1.09	11.22	0.64	10.98	0.95	.009
Mandibular second premolar	10.52	1.17	10.71	1.14	11.50	1.08	10.61	0.98	.066
Maxillary first molar	6.24	0.66	6.35	0.62	7.07	1.89	6.21	0.32	.015
Mandibular first molar	6.10	0.60	6.36	1.05	6.74	1.84	6.20	0.33	.301
Maxillary second molar	13.17	2.70	12.43	2.84	12.08	1.62	12.94	2.56	.364
Mandibular second molar	10.64	1.06	10.49	1.35	11.18	1.27	10.67	0.50	.357

P <0.05 significant

Underweight children were found to have late eruption of teeth compared to overweight children. Among the various BMI groups, mandibular central incisors, mandibular lateral incisors, maxillary second premolars and maxillary first molars were shown to have statistically significant difference in the age of eruption.

DISCUSSION

In this study the mean age of eruption of mandubular central incisors, mandibular lateral incisors, maxillary second premolars and maxillary first molars were found to have statistical significant difference between underweight, normal weight, risk of being overweight according to BMI status.

The findings in the present study were found to be contradictory to that of Nagaratna B et Al.[5] in which no statistical correlation was observed incisors and maxillary first molars. However the same study revealed a positive correlation between the mean age of eruption of maxillary second premolar and BMI, which is also noted in the present study.

The findings of the present study were contradicting to that of Khan et al.[6], in which there was no statistical significance between BMI and mean age of eruption except for mandibular lateral incisor. Observations of the present study were also in contrast to the study of Hoffding et al.[7], who reported only minor changes in tooth emergence with pronounced acceleration in physical development.

In this study, children in underweight category showed delayed eruption patters, which was similar to that done by chohan et al.[8]

CONCLUSION

Correlation between the different categories of BMI with the mean age of Eruption of permanent teeth was studied. Mandibular Incisors, Maxillary First Molars and Maxillary Second Premolars were found to have statistically significant eruption time among different categories of BMI.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: Approved by Institutional Ethical Committee

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