Article published online: 2022-07-06

Original Article

Effect of Dietary Pattern on the Emergence of Permanent Teeth of the Children of Larkana, Pakistan

Nazeer Khan[1] Sarfraz Ali Abbasi[2] Hasham Khan[3] Mujeeb ur Rehman Baloch[4] Arham Chohan[5]

[1] Office of Research, Innovation and Commercialization, Shifa Tameer Millat University, Islamabad, Pakistan
[2] Department of Dental Surgery, Chandka Medical College Hospital, Larkana, Pakistan
[3] Department of Pediatric Dentistry, Khyber College of Dentistry, Peshawar, Pakistan
[4] Department of Preventive/Community Dentistry, Bolan Medical College, Quetta, Pakistan
[5] Department of Paediatric Dentistry, CMH Lahore Medical College, Lahore, Pakistan

Address for correspondence Nazeer Khan, MSc, PhD, Office of Research, Innovation and Commercialization, Shifa Tameer-e-Millat University, Pitras Bukhari Road, Sector H-8/4, Islamabad 45710, Pakistan (e-mail: nazeerkhan54@gmail.com).

Ibnosina J Med Biomed Sci 2022;14:28–34.

Abstract

Objective The aim of this study was to determine the association of eruption of permanent teeth of Sindhi children of Pakistan with the consumption of wheat, rice, meat, and milk.

Methodology A team of two dentists (one male and one female) and two assistants (one male and one female) was trained and calibrated before the study and visited all the 26 selected schools on the prearranged time and date and all the children from kindergarten 1 to class 8 were screened. Children with at least one "just erupted" tooth were taken out of the class for further examination. Number of days of eating meat, rice, vegetable, and milk in a week along with date of birth and some other personnel information was recorded on a questionnaire sheet.

Results One thousand two hundred five cases were collected from 26 schools, located in the city of Larkana and its suburbs. The minimum median value belonged to tooth number 16 and the maximum value was for tooth number 27. Twenty-two out of 28 teeth (79%) showed early eruption who consumed the meat more frequently than lesser time. Twenty-three out of 28 teeth (82%) showed early eruption for the children who consumed the vegetable diet a lesser number of times as compared with more frequent. Nineteen out of 28 teeth (68%) showed delayed eruption for those who consumed the rice a lesser number of times as compared with more frequent. Eighteen out of 28 teeth (64%) showed early eruption for the children who consumed a lesser amount of milk as compared with a greater amount.

Conclusion The study concludes that a protein-rich diet accelerated, while calcium, mineral, and carbohydrate-rich food items delayed the eruption of permanent teeth among the children of Larkana.

Keywords
- dieting patterns
- just erupted tooth
- Larkana (Sindh province)
- time of eruption

DOI https://doi.org/10.1055/s-0042-1748671.
ISSN 1947-489X.

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

Introduction

Tooth eruption is defined as the movement of the tooth from the position of alveolar bone to the oral cavity through the oral mucosa.[1] Many factors such as gender, low birth weight, prematurity, endocrinology condition, socioeconomic attributes, malnutrition, obesity, and nutritional aspects may affect early or delayed tooth emergence.[2] Time and sequence of eruption of permanent teeth have been discussed in many countries covering all the continents as indicated in the literature.[3–5] In Pakistan, only a few studies have been published on this subject,[3–7] In most of the studies, only the effect of gender has been discussed.[3,4,8–11] However, other significant factors, such as dieting patterns, have not been given much attention. Only a few investigators have discussed the effect of nutrition on the time of eruption of permanent teeth.[5,7,12] Literature shows that only two articles have been published from Pakistan on this topic.[5,7] One study was conducted in the prepartition time of the subcontinent, comparing the time of eruption of permanent teeth between rice-eater children of Madras versus wheat-eater children of Lahore.[7] Another study was conducted to observe the effect of dieting patterns on the eruption time in Pakhtoon children of Peshawar.[5] Studied showed that malnutrition/underweight children usually delayed the eruption of primary and permanent teeth.[13] However, obese/overweight children made early development and eruption of permanent teeth.[14,15] It implies that nutrition intakes, which are directly proportional to the body weight of a child, affect the time of eruption of permanent teeth.

Literature indicates that the time of eruption of permanent teeth should be determined among different nationalities and races, in which the information is going to apply.[3,4,16–18] As indicated earlier, only a few studies have been conducted on the Pakistani population. Nevertheless, the effect of dietary patterns on the eruption of permanent teeth of Sindhi children has not been discussed in any of those studies. Therefore, this study was conducted to investigate this factor in time of eruption of permanent teeth among Sindhi children.

Methodology

This study is a part of multicenter-funded research conducted for establishing the time and sequence of eruption of permanent teeth of Pakistani children. Larkana was one of the centers, chosen for the study to determine the time of eruption of Sindhi children. A team of two dentists (one male and one female) and two assistants (one male and one female) was trained and calibrated before the study and kappa statistic was computed for satisfactory inter-examiners reliability. The team visited the randomly selected school at the prearranged time and date and all the children from kindergarten 1 to class 8 were screened for the study. Children with at least one "just erupted" tooth were taken out of the class for further examination. Consent from parents and assent from the children were accomplished before the screening. All the teeth were examined using a dental examination kit and the data was recorded in a Performa. Height and weight were measured using the weighing machine. The number of days of eating meat, rice, vegetable, and milk in a week along with some other personnel information was recorded on a questionnaire sheet. The date of birth of the children was obtained from the school record. If the child reported that the particular food item was usually eaten less than three times a week, it was categorized as "less frequent user," otherwise assigned as "more frequent user." The detailed methodology is reported in another article.[19] One thousand two hundred and five cases with at least one "just erupted" tooth were obtained. Statistical Package for Social Sciences (SPSS) (ver. 21) was utilized for data entry and analysis. "*t*" test was employed for comparison for different food items usually consume (less or more frequent).

Results

One thousand two hundred and five cases were collected from 26 schools of Larkana city and the suburbs. Six hundred fifty eight (54.6%) students were males and the maximum number of students were from grade 5 ($n = 223$; percentage= 18.5) (►**Fig. 1**). The mean age, height, weight, and body mass index (BMI) of the participants were 8.66 ± 2.1 year, 129 ± 12 cm, 26.8 ± 8.1 kg, and 16.0 ± 4.2 kg/m^2, respectively.

►**Table 1** describes the 3rd, 25th (Q1), 50th (median), 75th (Q3), and 97th percentiles of time of eruption of both the jaws. The minimum value of the 3rd percentile belonged to the left first molar (#26) with the value of 3.8 years. The maximum value of the 3rd percentile belonged to the left second molar (#27). The minimum value of the 50th percentile (median) value belonged to the right first molar (#16) and the maximum value was for the left second molar (#27). The minimum value of the 97th percentile also belonged to the left first molar (#26); however, the maximum 97th percentile appeared for the right second molar (#17). The minimum value of the 3rd percentile of mandibular teeth appeared for the left central incisor (#31) and the largest value belonged to the left second molar (#37). The minimum median value appeared for the right first molar (#46) and the largest was attached to the second molars (#37 and #47). The minimum value for the 97th percentile was for tooth number 46 and the largest value was for the left second molar (#37).

►**Table 2** discusses the comparison of mean eruption time of permanent teeth of the maxillary jaw for the Larkana children who consumed the meat, less frequently ($\leq$ 0–3 times/week) as compared with more frequent ($\geq$ 4 times/week). None of the teeth, except the left lateral incisor (#22), showed any significant difference between these two groups. However, 10 teeth out of 14 showed delayed eruption for the children who consumed the meat less frequently. None of the teeth of the mandibular jaw showed any statistically significant difference between the two groups. However, 12 teeth out of 14 showed delayed eruption for the children who consumed the meat a lesser number of times.

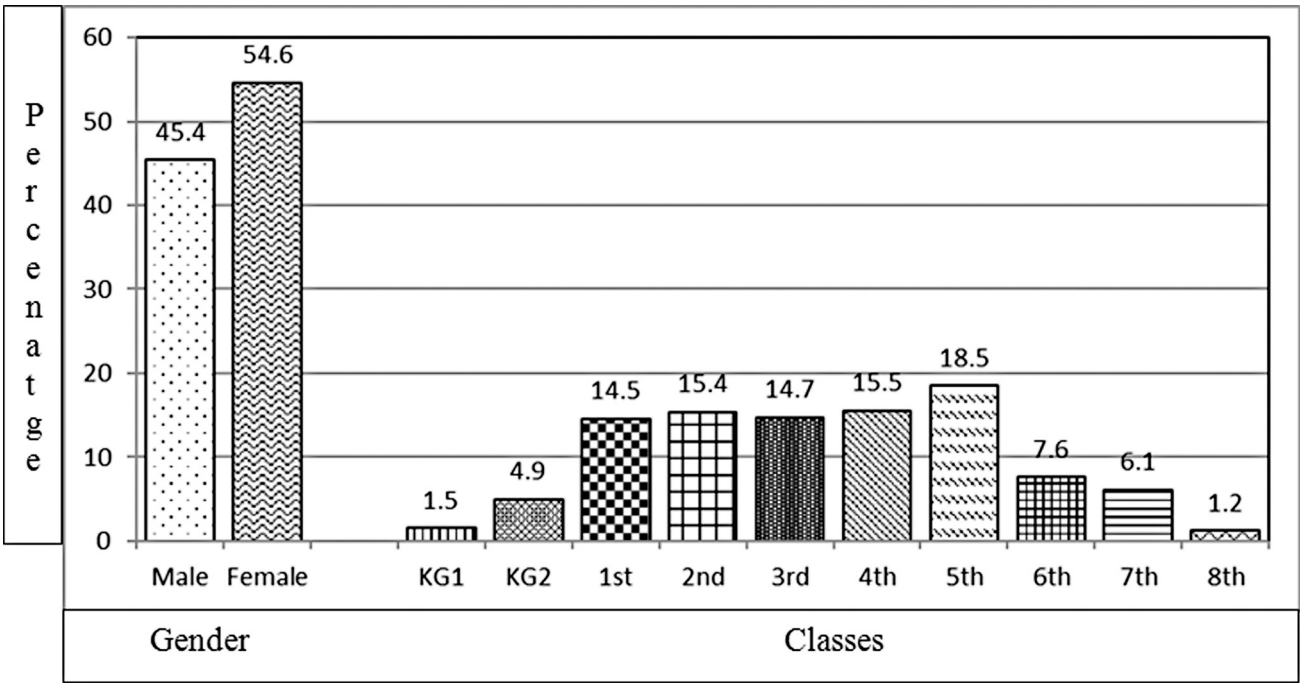

Fig. 1 Percentage of children among gender and classes.

In total, 22 out of 28 teeth (79%) showed early eruption who consumed the meat more frequently than lesser time.

►**Table 3** shows the comparison of time of eruption of teeth of the maxillary jaw for the children who consumed the vegetable a lesser number of times as compared with more frequent. None of the teeth, except the right second molar (#17), showed any statistically significant difference between these two groups. Fifty percent of teeth showed early eruption for the children who consumed the vegetable diet a lesser number of times as compared with more frequent. None of the teeth of the mandibular jaw showed any statistically significant difference between these groups. No clear direction appeared in the mean eruption time of these two groups.

Comparison of mean eruption time between the children of rice eater of lesser number of times than more frequent is discussed in ►**Table 4**. None of the teeth of the maxillary jaw, except the right second molar (#17), showed any statistically significant difference. However, nine teeth showed delayed eruption for the children who consumed the rice a lesser number of times, while four teeth showed early eruption. In one tooth, the mean of the two groups was the same. None of the teeth of the mandibular jaw showed any statistically significant difference between the mean eruption times of these groups. However, 10 teeth showed delayed eruption for the children who consumed the rice a lesser number of times as compared with more frequent. In total, 19 out of 28 teeth (68%) showed delayed eruption for those who consumed the rice a lesser number of times as compared with more frequent.

The comparison of milk with a lesser amount as compared with a greater amount on the time of eruption of teeth is discussed in ►**Table 5**. None of the teeth of the maxillary jaw showed any statistically significant difference. However, 10 teeth showed early eruption for the children who consumed a lesser amount ($\leq$ 0–3 cups/week) of milk as compared with a greater amount ($\geq$ 4 cups/week). None of the teeth of the mandibular jaw showed any significant difference between these two groups. Eight teeth showed early eruption for the children who consume a lesser amount than a greater amount. In total, 18 out of 28 teeth (64%) showed early eruption for the children who consumed a lesser amount of milk as compared with a greater amount.

Discussion

Pakistan is the fifth most populous country in the world, divided into four provinces. Each province is separated in different ethnic groups, including socioeconomic and cultural differences. Literature[3,4] indicates that the time of eruption should be obtained from the population in which it is supposed to be used, because it may differ due to ethical, cultural, and socioeconomic backgrounds. Therefore, studies on the eruption of teeth should be conducted for each ethical population. From Pakistan, studies have been published for Karachi[3] (overwhelming participants were Muhajir), Peshawar[4] (Pashtoon), Hyderabad[6] (Predominated Muhajir), and Lahore[7] (predominated Punjabi) children. Nevertheless, predominated Sindhi children are not covered in any of the above studies. Therefore, this study was conducted on the eruption of teeth among children of Sindhi origin. Part of the study is submitted for publication in another journal.[19]

The ratio of male and female children was not very much different. However, it was tilted upward in favor of female children. It indicates that a little bit more female children showed at least one "just erupted" tooth as compared with male children.

Table 1 Percentiles (25th, 50%, and 75th) of eruption time of Larkana children

Tooth number	P3	P25 Q1	P50 Median	P75 Q3	P97	Tooth number	P3	P25 Q1	P50 Median	P75 Q3	P97
17	6.2	9.1	9.8	11.4	12.1	47	5.4	8.8	10	11	11.3
16	4.1	5.3	6.0	6.9	8.6	46	3.7	5.3	6.1	6.9	7.2
15	4.6	7.1	8.3	10	10.2	45	6.1	7.2	9.0	10.3	11.7
14	5.1	8.1	9.1	10.1	11	44	6.3	7.8	9.0	10	11.3
13	6.6	8.3	9.4	10.8	11.6	43	6	8	9.0	10.2	11.2
12	4.9	6.9	7.9	8.5	8.5	42	4.2	6	6.8	7.7	8.9
11	4.8	6.2	6.6	7.3	7.3	41	4.3	5.5	6.3	6.9	8.2
21	4.0	5.9	6.4	7.1	7.1	31	3.2	5.3	6.3	6.9	8.0
22	4.8	6.6	7.7	8.5	8.5	32	4.3	6.2	7.0	7.8	8.7
23	6.2	8.3	9.8	11	12	33	6.0	7.9	8.9	10.1	11.2
24	5.1	7.9	8.9	10	10	34	6.1	7.9	9.1	10	11.3
25	4..6	7.8	8.5	10.1	10.1	35	6.2	8.2	9.0	10.3	11.7
26	3.8	5.4	6.1	6.9	6.9	36	3.3	5.3	6.2	7.0	9.0
27	6.9	8.8	10.0	11.1	11.1	37	7.2	8.8	10.0	11.3	12.1

Table 2 Comparison of eruption time among two categories of meat consumption

Tooth number	*n*	$\leq$ 0–3 times/ week	*n*	$\geq$ 4 times/ week	*p*-Value	Tooth number	*n*	$\leq$ 0–3 times/ week	*n*	$\geq$ 4 times/ week	*p*-Value
17	18	10.5 ± 1.3	13	9.5 ± 1.6	0.071	47	65	9.8 ± 1.5	36	9.7 ± 1.7	0.632
16	14	6.3 ± 1.6	7	6.2 ± 0.7	0.912	46	22	6.2 ± 1.8	12	6.1 ± 07	0.780
15	6	9 ± 2.8	13	8.1 ± 1.3	0.336	45	12	9.1 ± 1.1	22	8.9 ± 2.1	0.623
14	34	9 ± 1.9	38	9.1 ± 1.5	0.850	44	43	9.3 ± 1.6	58	9 ± 1.7	0.359
13	63	9.6 ± 1.5	59	9.3 ± 1.6	0.363	43	67	9.2 ± 1.6	61	9 ± 1.6	0.505
12	39	7.8 ± 1.4	28	7.7 ± 1.1	0.754	42	43	6.8 ± 1.8	40	6.9 ± 1.1	0.855
11	21	7 ± 1.5	25	6.7 ± 1	0.396	41	22	6.7 ± 1.9	22	6.1 ± 1	0.247
21	24	6.5 ± 1.5	34	6.6 ± 0.8	0.826	31	19	6.3 ± 1.3	14	6.1 ± 0.8	0.679
22	33	8.2 ± 1.6	40	7.2 ± 1.2	0.003	32	43	7.2 ± 1.4	30	6.7 ± 1	0.099
23	43	9.8 ± 1.6	4	9.5 ± 1.8	0.477	33	59	9.2 ± 1.8	58	8.8 ± 1.6	0.267
24	31	9.2 ± 1.9	33	8.4 ± 1.4	0.063	34	48	9.2 ± 1.9	55	8.8 ± 1.6	0.182
25	16	8.5 ± 1.9	9	9.4 ± 2.2	0.301	35	16	9 ± 1.2	14	9.5 ± 1.8	0.356
26	8	5.9 ± 2.6	8	6.4 ± 0.8	0.579	36	19	6.6 ± 2.3	11	6.1 ± 0.6	0.370
27	33	10.2 ± 1.5	8	9.8 ± 1.5	0.507	37	57	10.1 ± 1.6	40	9.9 ± 1.7	0.622

The 3rd, 25th (Q1), 50th (Median), 75th (Q3), and 97th percentiles of this study showed lower values as compared with Vithanaachchi,[10] Chaitanya,[20] Khan,[21] and Sindelarova[22] studies. The values of Vithanaachchi and Chaitanya, obtained from children of Sri Lanka and India, respectively, were a little bit far away from this study, while Khan's data, obtained from Karachi, Pakistan, were not were much higher than this study. The criterion of "just erupted" tooth is not very well defined in the articles of Vithanaachchi and Chaitanya. Probably they have also chosen the full appearance of teeth in their studies. That is why their time of eruption is noticeably higher than this study. The difference between Karachi and Larkana children could be due to the eating habits of the two populations. Larkana children may be using more conventional hard food and items containing more protein and that are why they have shown a little bit early eruption as compared with Karachi children. This study showed more variations as compared with Sindelarova's study. However, the median values of all the teeth of this study were less than Sindelarova's study. Comparing the 50th

Table 3 Comparison of eruption time among two categories of vegetable consumption

Tooth number	*n*	≤ 0–3 times/ week	*n*	≥ 4 times/ week	*p*-Value	Tooth number	*n*	≤ 0–3 times/ week	*n*	≥ 4 times/ week	*p*-Value
17	7	8.9 ± 1.6	25	10.5 ± 1.3	0.010	47	13	9.9 ± 1.2	89	9.7 ± 1.6	0.778
16	7	6 ± 0.9	14	6.4 ± 1.5	0.636	46	6	6.2 ± 0.8	28	6.2 ± 1.6	0.992
15	5	8.1 ± 1.4	16	8.5 ± 2	0.666	45	7	9.2 ± 2.5	27	8.9 ± 1.6	0.788
14	17	9.1 ± 1.4	57	9 ± 1.8	0.941	44	21	9 ± 1.7	84	9.1 ± 1.6	0.798
13	21	9.1 ± 1.8	102	9.6 ± 1.6	0.207	43	28	9.2 ± 1.8	101	9.1 ± 1.6	0.746
12	11	7.7 ± 0.8	57	7.7 ± 1.4	0.982	42	18	6.8 ± 1	65	6.9 ± 1.6	0.870
11	14	6.9 ± 1	32	6.8 ± 1.3	0.663	41	9	6.4 ± 0.5	35	6.4 ± 1.7	0.904
21	16	6.7 ± 0.9	42	6.5 ± 1.2	0.456	31	6	5.7 ± 0.6	27	6.3 ± 1.2	0.192
22	16	7.3 ± 1.1	58	7.8 ± 1.5	0.254	32	12	7.2 ± 0.9	61	7 ± 1.3	0.499
23	24	9.3 ± 1.8	81	9.7 ± 1.7	0.231	33	28	9 ± 1.8	89	9 ± 1.7	0.986
24	17	8.5 ± 1.5	49	8.9 ± 1.7	0.413	34	29	8.8 ± 1.5	75	9.1 ± 1.8	0.555
25	3	9.5 ± 2.3	22	8.8 ± 1.8	0.568	35	6	9.7 ± 2.1	24	9.1 ± 1.3	0.382
26	4	6.8 ± 0.3	12	6 ± 2	0.458	36	4	6 ± 0.8	26	6.4 ± 2	0.706
27	5	10.7 ± 1.3	37	10 ± 1.5	0.371	37	11	10.4 ± 1.8	87	9.9 ± 1.5	0.427

Table 4 Comparison of eruption time among two categories of rice consumption

Tooth number	*n*	≤ 0–3 times/ week	*n*	≥ 4 times/ week	*p*-Value	Tooth number	*n*	≤ 0–3 times/ week	*n*	≥ 4 times/ week	*p*-Value
17	5	8.7 ± 1.8	27	10.4 ± 1.2	0.013	47	10	10 ± 1.1	92	9.7 ± 1.6	0.655
16	6	6.3 ± 0.7	15	6.2 ± 1.5	0.954	46	4	6 ± 0.9	30	6.2 ± 1.6	0.769
15	4	8.5 ± 1.1	17	8.3 ± 2	0.840	45	6	9.5 ± 2.5	28	8.8 ± 1.6	0.389
14	14	9.4 ± 1.2	60	9 ± 1.8	0.401	44	22	9.4 ± 1.9	83	9 ± 1.6	0.283
13	20	8.2 ± 1.8	103	9.5 ± 1.6	0.343	43	27	9.3 ± 1.7	102	9.1 ± 1.6	0.551
12	10	7.9 ± 0.6	58	7.7 ± 1.4	0.482	42	15	6.8 ± 1	68	6.9 ± 1.6	0.930
11	10	7 ± 0.8	36	6.8 ± 1.3	0.645	41	7	6.4 ± 0.5	37	6.4 ± 1.6	0.950
21	11	6.7 ± 1.1	47	6.5 ± 1.1	0.552	31	5	5.6 ± 0.6	28	6.3 ± 1.2	0.199
22	10	7.5 ± 1.1	64	7.7 ± 1.5	0.728	32	8	7.6 ± 0.9	65	6.9 ± 1.3	0.171
23	20	9.7 ± 1.7	85	9.6 ± 1.7	0.744	33	25	9.2 ± 1.7	92	9 ± 1.7	0.613
24	16	8.8 ± 1.4	50	8.8 ± 1.8	0.913	34	23	9.3 ± 1.3	81	8.9 ± 1.9	0.345
25	2	8.2 ± 0.5	23	8.9 ± 2.1	0.643	35	5	9.9 ± 2.3	25	9.1 ± 1.3	0.281
26	4	6.8 ± 0.3	12	6 ± 2.1	0.458	36	3	6 ± 1	27	6.4 ± 2	0.739
27	4	10.6 ± 1.5	38	10 ± 1.5	0.482	37	12	10.6 ± 1.8	86	9.9 ± 1.6	0.172

percentile (median) with other studies showed that most of the teeth of the Larkana children erupted earlier than the children of other population.[3,10,20,22–24]

The dominant ingredients in the food items discussed in this study, as indicated in Khan et al,[5] are (1) carbohydrates in rice, (2) minerals, such as calcium, magnesium, and minerals, in vegetables, (3) protein in meat, and (4) fat and proteins in milk.

Literature indicates that it is essential for the proper nutrition of a child to be fed diverse food.[25] However, in most of the developing countries, especially in the small towns and rural areas, people are fed by monotonous diet with a small number of food items. Data from this multicenter project also showed that 15% of the children from Larkana were overweight or obese as compared with only 5% of the underweight children.[26] Furthermore literature indicated that obese children received their energy mostly from protein and fat, such as meat and milk, and less from carbohydrates.[5] Many studies[2,11,13,24,27] indicated a direct relationship between obesity and early eruption of primary and permanent teeth. This study showed that the mean eruption time of 22 out of 28 (79%) teeth was earlier among

Table 5 Comparison of eruption time among two categories of milk consumption

Tooth number	*n*	≤ 0–3 cups/ week	*n*	≥ 4 cups/ week	*p*-Value	Tooth number	*n*	≤ 0–3 cups/ week	*n*	≥ 4 cups/ week	*p*-Value
17	11	9.5 ± 1.6	21	10.5 ± 1.3	0.069	47	38	9.5 ± 1.5	64	9.9 ± 1.6	0.231
16	10	6.3 ± 1.4	12	6.1 ± 1.3	0.704	46	12	6.4 ± 0.6	23	6 ± 1.8	0.451
15	8	7.9 ± 1.1	13	8.6 ± 2.2	0.421	45	16	9.2 ± 2	18	8.7 ± 1.6	0.450
14	30	9.2 ± 1.4	44	8.9 ± 1.9	0.453	44	43	8.8 ± 1.4	61	9.2 ± 1.8	0.240
13	53	9.2 ± 1.7	70	9.7 ± 1.5	0.147	43	45	9.4 ± 1.9	84	8.9 ± 1.5	0.124
12	22	7.7 ± 1.1	46	7.8 ± 1.4	0.803	42	31	6.8 ± 1.3	52	6.9 ± 1.6	0.778
11	22	6.9 ± 1.4	24	6.7 ± 1.1	0.631	41	13	6.1 ± 0.8	31	6.6 ± 1.7	0.328
21	19	6.4 ± 0.8	39	6.6 ± 1.2	0.641	31	10	6.1 ± 1.1	23	6.2 ± 1.2	0.812
22	22	7.3 ± 1.2	52	7.8 ± 1.5	0.155	32	20	7.7 ± 1.3	54	6.9 ± 1.3	0..484
23	46	9.6 ± 1.9	59	9.7 ± 1.6	0.740	33	64	9.02 ± 1.8	53	9.11 ± 1.6	0.760
24	28	8.8 ± 1.6	38	8.9 ± 1.8	0.785	34	43	8.7 ± 1.6	61	9.2 ± 1.8	0.166
25	8	8.5 ± 1.5	17	9 ± 2.2	0.574	35	9	9.9 ± 1.9	21	9.3 ± 1.3	0.896
26	5	6.8 ± 0.3	11	5.9 ± 2.2	0.353	36	7	6.2 ± 0.7	23	6.4 ± 2.2	0.807
27	17	9.9 ± 1.2	25	10.2 ± 1.7	0.544	37	28	9.7 ± 1.6	69	10.2 ± 1.6	0.162

the children of the frequent user of meat. Ten out of 28 (35%) teeth showed early eruption of the frequent user of vegetables. Rouhani et al[28] concluded in a systematic and meta-analysis study that there was a direct relationship between the consumption of red and processed meat with obesity, BMI, and waist circumference. The early eruption of permanent teeth in this study could be influenced by the frequent use of meat only. Nevertheless, calcium, mineral, and carbohydrate-rich foods derived from the use of milk, vegetable, and rice delayed the eruption of teeth. The nutrition of the children is directly affected by food consumption and indirectly influenced by socioeconomic status and knowledge related to the diversity of food, selection, and availability of food items.[11]

As indicated earlier that nutrition and eating habits may change the time of eruption of permanent teeth, which has a significant effect on the dental treatment delivery in pediatric dentistry due to impact in occlusal, dental caries, and timing for orthodontic intervention.[2] Hence, this study will give some insight to the pediatric dental specialists to look into the dietary habits of the children, along with the other influencing factors to decide the early or late eruption of permanent teeth.

The schools were chosen from the city and the suburban areas of Larkana. Therefore, children going to schools from rural areas were not included, and they might have different dieting habits. Religious schools (Madaris) were also not included in the schools' selection. In Pakistan, most of the students of the religious schools live in hostels and are provided a scheduled controlled diet. It has also been reported that social pressure also produces "desirability biases" when reporting in such surveys.[5] Furthermore, most of the time, meals contain mixed food items on the table in Pakistani culture. However, asking each item separately will someway give nearly correct picture of the food items consumed in a week, and reduce this limitation. Keeping the above-mentioned limitations, the outcomes of this study should be read with caution. This study covered only four types of food items, without going into further details of those types. Therefore, a larger study is needed to find out the effect of diet on the time of eruption of permanent and primary teeth with the larger variety of food items.

Conclusion

The study concludes that a protein-rich diet accelerated, while calcium-rich food items delayed the eruption of permanent teeth among the children of Larkana.

Funding and Sponsorship
This study is funded by the Higher Education Commission of Pakistan.

Conflict of Interest
None declared.

References

1 Najman HM, Aldabbagh SA, Omer ZQ. Impact of socio-demographic and anthropometric variables on eruption time of permanent teeth among Kurds aged 5–15 years in Duhok Governorate-Kurdistan Region, Iraq. J Clin Diagn Res 2021;15 (06):10–15
2 Reis CLB, Barbosa MCF, Henklein S, et al. Nutritional status is associated with permanent tooth eruption in a group of Brazilian school children. Glob Pediatr Health 2021;8:X211034088. Doi: 10.1177/2333794 × 211034088
3 Khan N. Eruption time of permanent teeth in Pakistani children. Iran J Public Health 2011;40(04):63–73
4 Khan N, Khan H, Baloch MR, Abbasi SA. Time of emergence of permanent teeth of the children of Peshawar, Pakistan. J Pak Dent Assoc 2019;28(04):154–161

5 Khan H, Khan N, Baloch MR, Abbasi SA. Effect of diet on eruption times for permanent teeth of children in Peshawar. Pak Oral Dent J 2020;40(01):24–30
6 Shahid H, Hassan S, Shaikh AA. Eruption of permanent teeth; assessment of eruption of permanent teeth according to gender in local population. Prof Med J 2018;25(11):1741–1746
7 Shourie KL. Eruption age of the teeth in India. Indian J Med Res 1946;34(01):105–118
8 Korayem E, Khattab NA, El-Yazeed MA, Hassan NE, Abd El Wahab TM. Assessment of racial and socioeconomic status as factors affecting emergence of permanent teeth among a group of Egyptian and Sudanese children. Curr Sci Int 2021;10(02): 265–275
9 Gutiérrez-Marín N, Soto AL, Rivas JC. Age and sequence of emergence of permanent teeth in a population of Costa Rican schoolchildren. Odovtos Int J Dental Sci 2021;23(03):325–32
10 Vithanaarachchi N, Nawarathna L, Wijeyeweera L. Standards for permanent tooth emergence in Sri Lankan children. Ceylon Med J 2021;66(01):44–49
11 Lailasari D, Zenab Y, Herawati E, Wahyuni IS. Correlation between permanent teeth eruption and nutrition status of 6–7-years-old children. Padjadjaran Journal of Dentistry. 2018;30(02):116–123
12 Arid J, Vitiello MC, da Silva RA, et al. Nutritional status is associated with permanent tooth eruption chronology. Braz J Oral Sci 2017;16:e17065
13 Dimaisip-Nabuab J, Duijster D, Benzian H, et al. Nutritional status, dental caries and tooth eruption in children: a longitudinal study in Cambodia, Indonesia and Lao PDR. BMC Pediatr 2018;18(01): 300
14 Nicholas CL, Kadavy K, Holton NE, Marshall T, Richter A, Southard T. Childhood body mass index is associated with early dental development and eruption in a longitudinal sample from the Iowa Facial Growth Study. Am J Orthod Dentofacial Orthop 2018;154 (01):72–81
15 Mohamedhussein N, Busuttil-Naudi A, Mohammed H, UlHaq A. Association of obesity with the eruption of first and second permanent molars in children: a systematic review. Eur Arch Paediatr Dent 2020;21(01):13–23
16 Khan NB, Chohan AN, Al-Moghrabi B, Zahid T. Eruption time of permanent first molars and incisors among a sample of Saudi male schoolchildren. Saudi Dent J 2006;18(01):18–24
17 Chohan AN, Khan NB, AlNahedh L, Bin Hassan M, Al Sufyani N. Eruption time of permanent first molars and incisors among female primary school children of Riyadh. J Dow Univ Health Sci 2007;1(02):53–58
18 Khan N, Chohan AN, Al Nasser F, et al. Statistical presentation of eruption age of permanent second molars, premolars and canines in female school children living in Riyadh, Saudi Arabia. Saudi Dent J 2008;20(03):140–149
19 Khan N, Abbasi SA, Khan H, Baloch MR, Chohan A. Time of emergence of permanent teeth of the children of Larkana, Pakistan. Pak Orthodontic J, In press
20 Chaitanya P, Reddy JS, Suhasini K, Chandrika IH, Praveen D. Time and eruption sequence of permanent teeth in Hyderabad children: a descriptive cross-sectional study. Int J Clin Pediatr Dent 2018;11(04):330–337
21 Khan N. Time and Sequence of Eruption of Permanent Teeth in Pakistani children. Germany: Lambert Academic Publishing Company; 2012Saarbrucken, Deutschland, Germany
22 Šindelářová R, Žáková L, Broukal Z. Standards for permanent tooth emergence in Czech children. BMC Oral Health 2017;17(01):140
23 Kim C, Hong Y, Han DH, Hong HK, Kim YN, Bae KH. A prospective cohort study on emergence of permanent teeth and caries experience in Korean children. Int J Paediatr Dent 2011;21(04):254–260
24 Wong HM, Peng SM, Yang Y, King NM, McGrath CPJ. Tooth eruption and obesity in 12-year-old children. J Dent Sci 2017; 12(02):126–132
25 Shrestha N, Acharya J. Effect of early childhood malnutrition on tooth eruption sequence in Nepalese children. Tribhuvan University Journal. 2020;35(02):22–33
26 Ali SA, Khan N, Uddin M. Dental caries in Larkana and Peshawar children: effect of body mass index using Poisson regression model. J Oral Hyg Health 2017;5(03):227. Doi: 10.4172/2332-0702.100022
27 Evangelista SES, Vasconcelos KRF, Xavier TA, et al. Timing of permanent tooth emergence is associated with overweight/obesity in children from the Amazon Region. Braz Dent J 2018;29 (05):465–468
28 Rouhani MH, Salehi-Abargouei A, Surkan PJ, Azadbakht L. Is there a relationship between red or processed meat intake and obesity? A systematic review and meta-analysis of observational studies. Obes Rev 2014;15(09):740–748

