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ORIGINAL ARTICLE

Influence of diet patterns on time of emergence of permanent teeth of children of Quetta, Pakistan

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ABSTRACT

OBJECTIVE: To determine the effect of meat, vegetable, rice, and milk on the emergence of permanent teeth in children from Quetta city of Baluchistan province of Pakistan.

METHODS: This clinical cross-sectional study is part of a nationwide project, funded by Higher Education Commission (HEC) Pakistan, was conducted in Larkana, Peshawar, Lahore, and Quetta cities of Pakistan. The project was completed and submitted to HEC in March 2019. Twenty-five schools (14 public; 11 private sectors) of Quetta were selected from the list of schools using systematic random sampling. Children were selected from the classes with at least one 'just erupted tooth'. Status of the eruption of each tooth, height, weight, demographic information, and consumption of food items: meat, rice, vegetable, and milk in their family were recorded for each selected student.

RESULTS: Out of 1267 children fulfilling the criterion of 'just erupted' tooth', 703 (55.5%) were males. Mean of age, weight, height, and body mass index were 9.5±2.3 years, 27.9±10.4 kg, 131.7±14.3 cm, and 15.5±3.5 kg/m^2, respectively. The minimum and maximum values of the 1st quartile, median, and 3rd quartiles of time of eruption belonged to tooth numbers #16 and #17, respectively. Twenty out of 28 teeth showed early eruption in females than males, however, only four were statistically significant ($p<0.05$). Frequent users (≥4 days/week) of meat, rice, and milk showed early eruption of 68%, 61%, and 71% of the teeth respectively.

CONCLUSION: Children from Quetta showed early eruption of permanent teeth among frequent users of rice, meat, and milk products.

KEYWORDS: Children (MeSH); Baluchi children (Non-MeSH); Balochistan (Non-MeSH); Diet (MeSH); Eruption time (Non-MeSH); Pakistan (MeSH); Tooth (MeSH); Permanent tooth (Non-MeSH); Dentition (MeSH); Dentition, Permanent (MeSH)

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INTRODUCTION

The mechanical movement of a permanent tooth from the alveolar bone to the oral cavity is defined as the emergence of the permanent tooth.[1] This information which is the sequence and the time of emergence of permanent teeth is quite useful in pediatric dentistry, orthodontics, oral surgery, and forensic dentistry.[2] It is indicated in the literature that this information should be collected from the population, in which they are going to be used.[3] Therefore many countries, covering all the five inhabited continents, have conducted studies on the time and sequence of emergence of permanent teeth for their population as indicated by Khan,[2-4] however, only a few studies have been conducted for Pakistan.[1,2,4-8] It should be noted that one study was conducted before the partition of the subcontinent.[8] Literature reports that the time and sequence of emergence of permanent teeth may be influenced by many factors, such as gender, dietary patterns, low birth weight, premature delivery, socioeconomic status, malnutrition, obesity, and endocrinology condition.[9] But most of the studies have confined themselves to discussing only the effect of gender on the emergence of permanent teeth. However, the dietary patterns/nutrition status, which is also an important factor, has been discussed only by a limited number of studies.[1,5,8-12] In Pakistan, only a few studies[1,5,8] have been conducted on this subject. They have been conducted on the children of Larkana (Sindh), Peshawar (Khyber Pakhtoonkhwa),[5] and Lahore (Punjab).[8] But until now, none of the studies have discussed the effect of dietary patterns on the emergence of teeth in Baluchi children. Since different population consumes different food; culturally or customarily. Therefore, the dietary patterns of Baluchi foods may have a different effect on the emergence of teeth, as compared to the dietary patterns of other provinces of Pakistan. Hence the objective of the study was to determine the effect of meat, vegetable, rice, and milk on the emergence of permanent teeth in Quetta children.

The outcomes of this study will be helpful to the children and the parents by increasing their knowledge of mean and range of eruption of individual teeth of Baluchi children. This information will also give some understanding to the pediatric dental specialists to collect the information regarding the dietary habits

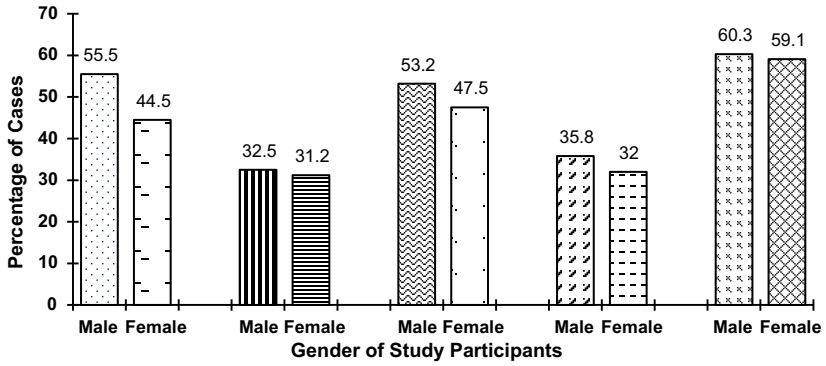

Figure 1: Percentage of number of cases, frequent user (≥ 4 days/week) of meat, vegetable, rice and milk of males and females

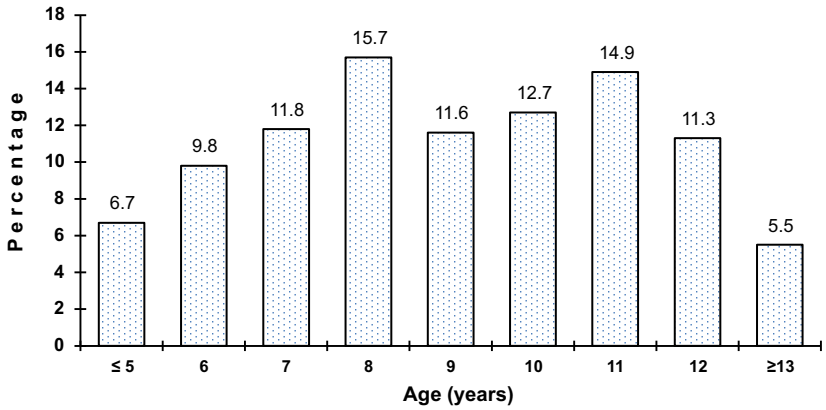

Figure 2: Percentage of the age of the children

of the children, along with the other inducing factors to determine the early or late eruption of permanent teeth, which would help the dentists in pediatric treatment plans and orthodontic interventions.

METHODS

This cross-sectional study was a part of nationwide project conducted in Larkana, Peshawar, Lahore, and Quetta; cities of Sindh, Khyber Pakhtunkhwa, Punjab & Baluchistan provinces of Pakistan respectively. The study was funded by the Higher Education Commission (HEC) of Pakistan and project was completed and submitted to HEC in March 2019. The sample size was computed using the outcome of a large-scale study conducted by the principal investigator on Karachi children,[4] using the following sample size calculator, https://www.gigacalculator.com/calculators/power-sample-size-calculator.php

The information inserted for the computation was a 95% confidence interval, 98% of the power of the test, a margin of error of 0.2 years of the mean of 11.3 years, and a standard deviation of 1.7 years of left maxillary 2nd molar of the study[4]. The total sample size was 7500 school children. It was divided into the sample sizes of four study centers. The portion of Quetta sample was 1300 school children, equally divided into male and female children. Twenty-five schools (14 public and 11 private sectors) were selected from the list of schools of the city of Quetta, using systematic random sampling. Children were selected from the classes, based on parents' written consent and children's assent with at least one 'just erupted tooth'. Just erupted tooth was defined as a tooth deemed to have emerged if any part of it is visible in the mouth. Inclusion criteria were the consent of parents with the assent of the child and Pakistani nationality. The exclusion criteria were systemic diseases, syndromes, and local alterations of dental eruption, such as dentigerous cysts, craniofacial deformities, general developmental disorders, and dental anomalies (including dental agenesis). Height and weight were measured in centimeters and kilograms, respectively, using a height-weight machine without shoes in the sunlight, and a questionnaire was administrated. Along with demographic information, the amount of meat, rice, vegetable, and milk, usually consumed in their family were recorded. The study was approved by the Institutional Review Board (IRB) of Dow University of Health Sciences (No. IRB-B-17/DUHS-10). The detailed methodology of the study is discussed in Khan et al,.[2,4] The qualitative variables were age, height, weight, time of eruption of all 28 teeth, and quantity of food items (meat, vegetable, rice, and milk) used most of the time in their homes. The qualitative variables were class, gender, place of birth, and race of the child. Data was entered and analyzed using SPSS (version 23.0). Descriptive statistics such as mean, median, standard deviation, and interquartile range were computed for quantitative variables, while frequency and percentages were reported for qualitative variables. The interquartile range is the difference between the 1st and the 3rd quartiles of the data, while the median is the 2nd quartile. The normality assumption of the quantitative variables was assessed using a one-sample Kolmogorov-Smirnov test. Two-sample 't- test was employed if the normality assumption was fulfilled, otherwise, the Mann-Whitney test was applied for comparison of the mean eruption time of two groups of food items as mentioned above for less (≤3 times a week) and more frequent (≥4 times a week) consumption. The mean eruption time was also compared for male and female children. A P-value less than 0.05 was considered statistically significant

RESULTS

One thousand two hundred sixty-seven (1267) children fulfilled the criterion of 'just erupted tooth' from 25 selected schools. Out of 1267 children, 703 (55.5%) were males and 564 (44.5%) were females (Figure 1), and the largest group (n =198; 15.7%) of the children belonged to 8 years (Figure 2). The mean of age, weight, height, and Body Mass Index (BMI) were 9.5±2.3 years,

Table I: Percentiles (3rd, 10th, 25th, 50th, 75th, 90th, and 97th) eruption time of all the teeth, except third molars

Tooth No.	P3	P10	P25	P50 Median	P75	P90	P97	Tooth No.	P3	P10	P25	P5 Median	P75	P90	P97
17	8.3	11.1	11.8	12.5	13.3	14.1	14.6	47	8.7	10.8	11.5	12.0	12.4	13	13.3
16	4.8	5.0	5.2	5.5	5.7	6.2	6.3	46	4.6	4.6	5.3	5.5	5.8	7.4	7.4
15	6.5	9.6	10.5	11.3	12.4	13.4	14.4	45	9.9	11.1	12.4	11.8	12.9	13.4	9.9
14	7.8	8.7	9.0	9.8	10.8	11.6	12.8	44	8.6	9.0	9.6	10.3	11	11.6	12.3
13	7.8	9.0	10.4	11.4	12.3	13.2	13.7	43	7.9	8.1	8.7	9.2	10.3	11.3	12.5
12	6.1	6.8	7.7	8.3	8.8	10.6	12.2	42	6.3	6.7	7.0	7.4	8.1	8.5	8.5
11	5.9	6.2	6.5	7.0	7.5	8.2	8.5	41	5.2	5.6	5.8	6.3	6.9	7.3	7.9
21	5.7	5.9	6.3	6.7	7.3	8	8.7	31	5.2	5.6	5.9	6.3	6.9	7.5	8.8
22	6.6	7.3	7.7	8.1	8.6	10	12.6	32	5.8	6.7	7.1	7.4	8	8.9	8.5
23	8.7	9.0	10.0	11.1	12.1	13.3	13.5	33	7.8	8.0	8.5	9.3	10.4	11.4	12.2
24	8.2	8.6	9.1	10.0	11.1	11.9	12.6	34	7.7	8.4	9.0	9.9	11.2	11.9	13.7
25	9.3	10	10.5	11.1	11.9	13.1	13.7	35	10.3	10.6	11	11.5	12.4	13.4	13.4
26	4.7	4.9	5.3	5.6	6.0	7.2	7.2	36	5.2	5.2	5.5	5.8	6.4	8.0	8.0
27	8.8	10.5	11.5	12.4	13.0	13.5	15.1	37	8.9	10.6	11.6	12.2	12.9	13.6	14.1

Table II: Comparison of median values of time of eruption of males and females children

Tooth No.	Male	Female	p-value	Tooth No.	Male	Female	p-value
	Median (Interquartile range	Median (Inter quartile range)			Median (Interquartile range	Median (Inter quartile range)	
17	12.6 (11.8, 13.4)	12.5 (11.4, 12.8)	0.366	47	12.3 (11.5, 12.8)	11.7 ((11.5, 13.1)	0.050
16	5.6 (5.1, 5.7)	5.4 (5.2, 5.6)	0.536	46	5.6 (5.2, 7.4)	5.5 (5.3, 5.6)	0.633
15	11.3 (10.5, 12.3)	11.0 (10.2, 12.0)	0.441	45	11.8 (11.2, 12.6)	11.9 (10.8, 12.4)	0.949
14	9.3 (9.0, 10.9)	9.8 (9.2, 10.8)	0.310	44	10.3 (9.6, 11.2)	10.4 (9.6, 10.9)	0.788
13	11.6 (10.8, 12.3)	11.0 (10.1, 12.1)	0.075	43	8.8 (8.5, 9.9)	9.8 (8.9, 10.8)	0.003
12	8.3 (7.5, 9.3)	8.3 (7.7, 8.8)	0.889	42	7.6(7.3, 8.3)	7.2 (6.8, 8.1)	0.046
11	7.1 (6.6, 7.5)	6.8 (6.3, 7.7)	0.336	41	6.4 (5.9, 6.9)	6.1 (5.7, 6.8)	0.399
21	6.8 (6.3, 7.4)	6.5 (6.1, 7.1)	0.117	31	6.4 (5.9, 7.0)	6.3 (5.9, 6.8)	0.332
22	8.2 (7.8, 9.0)	8.0 (7.7, 8.4)	0.290	32	7.4 (7.2, 8.0)	7.5 (7.0, 8.1)	0.745
23	11.1 (10.1, 12.3)	11.0 (9.8, 11.9)	0.578	33	8.7 (8.1, 9.8)	9.8 (8.8, 11.2)	0.003
24	10.3 (9.3, 11.6)	9.6 (8.8, 11.1)	0.053	34	9.5 (9.0, 11.3)	10.3 (8.9, 11.0)	0.908
25	11.1 (10.7, 12.0)	11.0 (10.2, 12.0)	0.540	35	11.9 (11.1, 12.8)	11.2 (10.9, 11.8)	0.127
26	5.9 (5.6, 7.6)	5.5 (5.3, 7.8)	0.181	36	6.3 (5.7, 8.2)	5.5 (5.7, 8.2)	0.222
27	12.3 (11.5, 12.9)	12.5 (11.9, 13.3)	0.244	37	12.3 (11.6, 13.1)	12.0 (11.6, 13.1)	0.862

Table III: Comparison of eruption time among 2 categories of meat consumption

Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≤ 4 times/week*	p-value	Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≤ 4 times/week*	p-value
17	36	12.4±1.4	8	12.7±1	0.475	47	45	11.9±1.3	10	11.8±0.7	0.899
16	13	5.5±0.4	1	5.3±0.0	0.737	46	13	6.7±2.6	1	7.4±0.0	0.019
15	31	11.3±1.9	13	11.6±1.2	0.604	45	29	11.5±1.2	9	12.0±0.7	0.346
14	65	9.9±1.1	15	10.3±1.7	0.342	44	50	10.3±1	8	10.3±1	0.896
13	79	11.1±1.6	22	11.6±1.1	0.138	43	91	9.4±1.2	15	10.4±1.2	0.003
12	52	8.4±1.4	3	8.9±2.3	0.559	42	52	7.6±1	3	7.3±0.3	0.566
11	61	7.1±0.7	3	8.0±2.0	0.489	41	51	6.4±0.7	1	5.6±0.0	0.240
21	53	6.8±0.8	5	7.3±1.8	0.611	31	46	6.5±0.9	2	5.8±0.4	0.165
22	71	8.5±1.3	5	7.6±0.8	0.070	32	44	7.6±0.9	6	7.9±2.2	0.502
23	57	10.9±1.4	20	11.6±1.4	0.067	33	61	9.3±1.3	13	10.4±0.9	0.007
24	66	10.1±1.4	11	10.4±1.2	0.485	34	38	10.1±1.2	7	10.2±2.2	0.923
25	26	11.4±1.2	8	10.9±0.8	0.247	35	21	11.8±1.1	6	11.9±1.1	0.741
26	15	6.6±2.4	1	10.6± 0.0	0.131	36	13	6.9±2.1	1	5.4±0.0	0.511
27	28	12.3±1.1	9	12.0±1.8	0.656	37	48	12.0±1.4	19	12.3±1.3	0.395

* Mean±Standard Deviation

Table IV: Comparison of eruption time among 2 categories of vegetable consumption

Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≥ 4 times/week*	p-value	Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≥ 4 times/week*	p-value
17	10	12.5±0.8	15	12.0±1.9	0.425	**47**	16	11.4±1.8	13	11.8±0.7	0.470
16	2	5.7±0.1	3	5.8±0.4	0.819	**46**	5	8.0±3.5	2	12.3±0.2	0.166
15	15	11.9±1.3	13	11.2±1.5	0.146	**45**	15	12.0±1.0	12	11.3±1	0.107
14	26	9.9±1.1	23	10.1±1.5	0.523	**44**	21	10.2±1	17	10.1±0.8	0.860
13	32	11.5±1.3	33	11.4±1.2	0.793	**43**	26	9.8±1.2	38	9.4±1.3	0.194
12	17	8.2±1	19	8.5±2	0.659	**42**	22	7.6±0.6	16	7.7±1.2	0.921
11	17	7.2±0.6	14	7.5±1.1	0.306	**41**	15	6.4±0.5	8	6.9±0.5	0.028
21	15	6.8±0.7	15	7.2±1.2	0.283	**31**	10	6.6±0.5	8	6.8±0.9	0.507
22	26	8.5±1	23	8.4±1.5	0.821	**32**	16	7.6±1.4	14	8.1±0.9	0.256
23	22	11.2±1.6	27	10.7±1.3	0.316	**33**	23	9.5±1.4	21	9.6±1.4	0.968
24	21	10.1±1.5	24	10.3±1.2	0.684	**34**	13	9.7±1.4	16	9.8±1.4	0.877
25	11	10.9±0.5	8	11.8±1.2	0.088	**35**	11	11.7±1	9	11.9±0.8	0.640
26	4	7.3±2.5	4	7.1±2.4	0.927	**36**	5	6.7±1.3	2	7.9±3.2	0.441

* Mean±Standard Deviation

Table V: Comparison of eruption time among 2 categories of rice consumption

Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≥ 4 times/week*	p-value	Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≥ 4 times/week*	p-value
17	42	12.4±1.3	2	12.5±0.1	0.894	**47**	53	11.8±1.2	2	12.4±0.1	0.539
16	13	5.5±0.4	1	5.3±0.1	0.737	**46**	12	7.5±3.4	2	5.5±0.1	0.431
15	43	11.4±1.7	1	12.6±	0.483	**45**	36	11.7±1.1	2	10.8±2.3	0.279
14	76	9.9±1.2	4	10±1.7	0.973	**44**	58	10.4±0.9	1	8.3±0.0	0.030
13	89	11.1±1.6	12	11.9±1.1	0.088	**43**	92	9.5±1.2	14	9.7±1.3	0.661
12	53	8.4±1.4	2	8.0±1.6	0.649	**42**	50	7.7±1.0	5	7.3±0.4	0.396
11	60	7.1±0.8	3	6.5±0.3	0.194	**41**	43	6.5±0.7	10	6.1±0.7	0.074
21	52	6.9±0.9	5	6.3±0.4	0.133	**31**	41	6.6±0.9	8	6.1±0.8	0.176
22	70	8.4±1.1	6	9.0±2.4	0.575	**32**	50	7.7±1.2	2	7.1±0.2	0.452
23	70	11.1±1.5	7	10.9±1.2	0.744	**33**	66	9.5±1.3	8	9.6±1.2	0.801
24	75	10.1±1.4	3	9.1±1.3	0.231	**34**	38	10.1±1.4	7	10.0±1.2	0.945
25	30	11.2±1.1	4	11.5±1.5	0.605	**35**	25	11.9±1.1	2	10.8±0.2	0.178
26	16	6.8±2.5	0			**36**	11	7.2±2.2	3	5.4±0.2	0.204
27	30	12.0±1.3	7	13.0±1.1	0.063	**37**	60	12.1±1.4	7	12.0±1.5	0.885

* Mean±Standard Deviation

Table IV: Comparison of eruption time of Quetta children among 2 categories of milk consumption

Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≥ 4 times/week*	p-value	Tooth No.	No. of cases	≤ 3 times/week*	No. of cases	≥ 4 times/week*	p-value
17	24	12.8±1	20	12.0±1.5	0.040	**47**	30	12.0±0.6	25	11.7±1.6	0.327
16	6	5.3±0.5	8	5.6±0.3	0.284	**46**	4	8.0±4.2	10	7.0±2.9	0.593
15	24	11.3±1.8	20	11.5±1.5	0.746	**45**	24	12.0±0.9	14	11.0±1.2	0.009
14	32	10.4±1.4	47	9.7±1.0	0.013	**44**	26	10.7±0.8	33	10.1±1	0.018
13	50	11.5±1.3	51	10.9±1.7	0.040	**43**	36	10.2±1.3	69	9.2±1.1	<0.001
12	14	9.6±1.8	41	8.0±1.0	0.007	**42**	9	7.9±1.4	45	7.6±0.9	0.344
11	14	6.8±0.7	49	7.2±0.8	0.105	**41**	19	6.2±0.7	34	6.6±0.7	0.042
21	12	6.6±0.6	45	6.9±0.9	0.254	**31**	18	6.3±0.8	31	6.6±0.9	0.195
22	22	9.0±1.5	54	8.2±1.1	0.017	**32**	6	7.6±0.4	45	7.7±1.2	0.726
23	37	11.4±1.3	40	10.8±1.5	0.077	**33**	24	10.0±1.2	49	9.3±1.3	0.044
24	34	10.6±1.3	44	9.7±1.3	0.005	**34**	18	10.1±1.5	27	10.0±1.4	0.797
25	14	11.5±1.1	20	11.1±1.1	0.237	**35**	15	11.8±0.9	12	11.9±1.3	0.753
26	7	7.6±3.3	9	6.3±1.7	0.324	**36**	5	8.0±2.7	9	6.2±1.5	0.140
27	19	12.7±1	18	11.7±1.4	0.013	**37**	30	12.7±1.1	37	11.9±1.5	0.273

* Mean±Standard Deviation

27.9±10.4 kg, 131.7±14.3 cm, and 15.5±3.5 kg/m^2, respectively.

Table I shows the 3rd, 10th, 25th, 50th, 75th, 90th, and 97th percentile values of the time of eruption of all the teeth, except the third molars. The minimum value of the 3rd percentile belonged to the right mandibular 1st molar (#46) with a value of 4.6 years, while the maximum value of the 3rd percentile was for the mandibular left 2nd molar (#37) with a value of 8.9 years. The minimum of 10th percentiles corresponded to the right mandibular 1st molar (#46) with a value of 4.6 years, while the maximum value for this percentile belonged to the maxillary 2nd molar (#17) with a value of 11.1 years. The minimum value of 1st quartile (25th percentile) belonged to maxillary right 1st molar (#16) with a value of 5.2 years, while the maximum value also belonged to the same quadrant, mandibular right 2nd molar (#17) with a value of 11.8 years. The median values (50th percentile) of the time of eruption showed that the minimum value belonged to 1st molars of right mandibular and maxillary teeth (#16 & #46) with the value of 5.5 years, while the maximum value corresponding to the right maxillary tooth (#17) with the value of 12.5 years. The minimum value in the list of the 3rd quartile (75th percentile) was 5.7 years corresponding to the maxillary right 1st molar (#16), while the maximum value of 13.3 years also belonged tothe 2nd molar (#17) of the same quadrant. Since the values of the 90th and 97th percentiles were quite close to each other. Therefore, the 97th percentile is discussed here. The minimum value of this percentile belonged to the 1st mandibular right molar (#16) with a value of 6.3 years, while the maximum value was 15.1 years corresponding to the left mandibular 2nd molar (#27).

The median, interquartile range, and the comparison of the time of eruption for the male and female children are shown in Table II. Twenty out of 28 teeth (more than 70%) showed that the female children erupted earlier than male children. Four teeth (#47, #43, #42, and #33) showed significant differences with p-values of 0.05, 0.003, 0.046, and 0.003, respectively. However, two of them showed early eruption for males, and 2 teeth showed another way around. But all of them belonged to mandibular teeth. The remaining tables discuss the consumption of meat, vegetable, rice, and milk, divided into less frequent consumption (≤ 3 days/week) and more frequent consumption (≥ 4 days/week).

Table III discusses the consumption of meat during a usual week. The table shows that the children with the time of eruption of 19 out of 28 teeth indicated early eruption for less frequent users of meat products as compared to more frequent users. Most of the teeth of early eruption with more frequent meat product users had very few samples (n≤ 5). Three mandibular teeth (#46, #43, and #33) showed statistically significant p-values of 0.019, 0.003, and 0.007, respectively of early eruption as compared to the more frequent users.

The vegetable consumption related to time of eruption is shown in Table IV. Seventeen teeth showed early eruption for less frequent consumers of vegetable dishes. However, none of the pairs of less or more frequent consumers, except tooth #41 (p=0.028), showed any statistical significance.

Table V shows the use of a rice diet in a usual week for children with just erupted teeth. Most of the teeth with just eruption (17 teeth out of 28) showed late eruption with less frequent (≤ 3 days/week) consumption of rice. One tooth (#26), did not have any case for the more frequent group, therefore was not considered. Only one tooth (#44) showed significantly early eruption for the more frequent group of rice consumption (p-value 0.030).

The consumption of milk by the children of the sample is discussed in Table VI. Only 8 teeth out of 28 showed early eruption in the children with less frequent users. However, 12 teeth showed significantly early eruption for the children with the more frequent user of milk drinkers.

Figure 1 showed that the male children eat vegetable and rice products significantly more time than female children with p-values of <0.0001, and 0.001, respectively.

DISCUSSION

The objective of the study was to determine the effect of food items such as meat, vegetable, rice, and milk on the emergence of permanent teeth in Quetta children. Quetta is the largest city and provincial capital of Baluchistan. Even though the total number of inhabitants of Baluchistan is only 3.6% of the total population of Pakistan, but area wise this is the largest province and covers about 42% of the total area of Pakistan. The Baluchi people are Iranian natives living mainly in the Baluchistan provinces of Iran, Pakistan and Afghanistan.[13] Due to their differences in genetics[13] and life style[14] as compared to other populaces of Pakistan, the dieting patterns of inhabitants of this province are also quite different. As mentioned in Introduction section that the emergence of permanent teeth are also affected due to the dieting patterns and food consumption.

Twenty-five schools were randomly selected from 518 high schools in Quetta, which was about 5% of the total number of schools. Male children were more than 10% than female children; 55:45. This ratio is a little bit different from a study by Ali et al.,[15] which was tilted toward the girls' side, indicated as 60:40 in 2018. About 80% of the cases were found among children of 7 to 12 years. The percentage of the children in this range is in agreement with Khan's4 study of Karachi children. It is because the admission in first grade is about 5 to 6 years in all over Pakistan. Therefore, there is no change in age-groups from grade 1 to grade 10 in all the schools.

Comparing the outcomes of this study regarding the first quartile (P25), median (P50), and third quartile (P75) of eruption time of maxillary teeth with reported data showed that the Quetta children had an early eruption for the first permanent molar than Indian (Hyderabad),[17] Sri Lankan,18 Karachi (Pakistan),[4] Peshawar (Pakistan)[5] children. However, it is almost the same as the eruption time of the maxillary first molar of Larkana (Pakistan)[6] children. Furthermore, the children of Quetta had a late eruption for the 2nd maxillary molar as compared to Indian (Hyderabad),[17] Sri Lankan,[18] Pakistani (Larkana,[6] Karachi,[4] and Peshawar[5]) children. It implies that the eruption of teeth of Quetta children has more variation in eruption time as compared to all other studies reported from Pakistan and other neighboring countries. Higher variation has also been detected among the eruption of first permanent mandibular molars and 2nd

permanent molars against studies published in Pakistan and neighboring countries.

In most of the cases (20 out of 28 teeth) the median eruption time of females was earlier than male children. However, only two of them were statistically significant. This outcome is in agreement with some of the studies conducted in Central America (Costa Rica),[19] and North Africa (Egypt).[20] Furthermore, most of the studies performed in Asia (India and Pakistan)[2,4,6] showed the same trend as this study. However, most of the studies conducted in American and European countries showed significant early eruption time of girls as compared to boys.[11,16,21,22]

Khan et al.,[5] indicated the main ingredients and its quantities in rice, meat, vegetable, and milk. Major components in rice, meat, vegetable, and milk are, carbohydrate, protein, minerals (calcium, magnesium, etc), and fate & calcium, respectively.

The main ingredient of rice is carbohydrates. The starchy food produces the acid up to 20 minutes after it comes in contact with the oral cavity. This acid damages the primary teeth by developing dental caries and extraction occurs. Consequently, the permanent teeth erupt earlier.[5] May be due to this reason, this study showed that 17 out of 28 (61%) teeth erupted earlier for the children who consumed the rice diet more frequently. Furthermore, milk which is full of fat and calcium makes the teeth strong and healthy.[5] Excessive use of meat and milk makes the body obese and heavy.[23] Literature indicates that there is a direct relationship between obesity and early eruption of primary and permanent teeth.[1,5,9] Therefore, more frequent use of these foods affects early eruption as shown in our results.

There are a few other factors that could have affected the outcomes of this study. Firstly, this study was conducted in regular schools. So religious schools and out-of-school children are not included. In religious schools, the children are fed with monotonous foods with only a few variations. The children who are out of school are mostly from low socio-economic groups. Their dieting habits are different from the socio-economic groups of above their level. These two groups are not included and it could have skewed the results. Secondly, the survey was based on self-reported information. It is usually the tendency of human beings, especially children to show off a better standard of living in their family, which is called a 'desirable bias' and consequently could have reported higher values concerning the consumption of meat and milk.1 Furthermore the meals on the Pakistani dining tables contain mixed food items due to the nucleus family system, and asking for different food items separately could also strengthen the 'desirable biases'. Therefore the outcomes of this study should be read with caution due to the above-mentioned limitations.

This study covers only four types of food items without going into further detail. Hence a study with a larger variety and quantity of food consumption is needed to verify these results regarding the effect of dietary patterns on the time of eruption of permanent teeth.

CONCLUSION

The study concludes that the duration of the eruption of permanent teeth of children from Quetta city of Baluchistan province of Pakistan, from the first tooth to the last tooth (most of the time 2nd molars) has a large variation as compared to the children of other provinces. Children from Quetta showed early eruption of permanent teeth among frequent users of rice, meat, and milk products.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

NK: Concept and study design, analysis and interpretation of data, drafting the manuscript, critical review, approval of the final version to be published

MuRB, HK, AC, SAA: Concept and study design, acquisition of data, drafting the manuscript, approval of the final version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

Authors declared no conflict of interest

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DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request