Time of Emergence of Permanent Teeth of Children of Quetta, Pakistan and Factors Affecting Them

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Abstract

Objectives: The objective of this study was to determine the time and sequence of emergence of permanent teeth of Baluchi children and compare them with other national and international reported data. Furthermore, to find out the effect of gender (male/female) type of schools (private/public); and relationship with height, weight, and body mass index of the children at the time of emergence.

Methods: Systematic cluster random sampling procedure was used for sample selection. Two dentists along with 2 assistants visited 25 selected schools for data collection. Children with 'just erupted tooth' were selected for data collection. One thousand two hundred and sixty-seven selected children were examined. The selected children were examined for the status of emergence (not erupted, just erupted and erupted) in each tooth. Height and weight were measured and questions regarding food items usually consume in their families were recorded. Two independent samples 't' test, Pearson and partial corrections were used for comparisons and correlations.

Results: Male children showed significant higher values of height, weight, and BMI as compared to the female children. Right 1st molars (#16 and #46) showed the lowest mean values of 5.5 and 5.6 years in upper and lower jaws, respectively. 2nd molars (#17 and #37) showed maximum mean values of 12.4 and 12.1 years in upper and lower jaws, respectively. Most of the mean values of male children were higher or equal to the female children. Most of the teeth showed higher values for private schools as compared to public schools. But none of above-mentioned differences were statistically significant. Twenty-two teeth showed significant correlation between emergence time and height of the children, while only 17 teeth showed significant correlation with weight.

Conclusion: Mean eruption time of this study was higher than other national studies, but almost the same as other countries data. The eruption time of female children were insignificantly earlier than male children, which do not agree with other American, European African children. Time of emergence was delayed with increasing height, irrespective of the heavy or lightweight children. However, emergence time delayed with weight, if the child was also tall, but has no relationship with weight if the child is short

Key words: Children, dentition, Pakistan, permanent teeth

Introduction

In many under-developed countries, the birth records are not properly organized, especially in rural areas. However, the chorological age is indeed needed in many medico-legal requirements, su-

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ch as selection in the age-bounded sport teams, job selection, school admission, legal prerequisite (juvenile/adult) or refugee children. In the absence of proper birth record, the time of emergence of teeth (TET) can be used to acquire these requirements by screening the teeth[1]. Furthermore, TET can also be used in clinical treatments such as pediatric, orthodontic or forensic dentistry. Pediatric dentist decides to retain the carious tooth by endotreatment or filling using the time of emergence (TE) of that particular tooth. Orthodontist decides when to start the orthodontic treatment, depends upon the time and sequence of emergence of teeth. In major disasters, like fire or plane crash, the time of TET helps the forensic dentists to estimate the chronological age of the victim for medico-legal requirements[2]

In Pakistan dentists use the table of Time and Sequence of Emergence (TSET) developed by European and American dental fraternity for clinical and academic purposes[,2]. However, it has been indicated in the literature that TSET vary between different nations and ethical groups due to bioethical differences and therefore, standard TSET should be determined for a nation or ethical group in which they are going to be used[2]. Therefore, TSET have been determine for many nations and ethical units in all the continents (America, Asia, Africa and Australasia)[3].

Literature shows that only few studies have been conducted for Pakistan[3]. One study was conducted before partition of sub-continent for Lahore boys[4]. Five major ethnic groups encompassed the population of Pakistan: Punjabis, Sindhis, Pakhtoon, Mohajir, and Baluchis. Time of emergence of permanent teeth of the children for the first four ethnic groups have been reported earlier by Khan[1-3] and Mahmood[5]. However, the data of Baluchi children have not been discussed earlier. Baluchis are quite different from the other ethnic groups of Pakistan, culturally and physically[6]. Therefore, this study was conducted to determine the time of emergence of permanent teeth for the children of this particular ethnic group. After conducting this study, a comprehensive picture of teeth of eruption of permanent teeth of all the major ethnic groups of Pakistan will be completed. The objective of this study is to determine the time of emergence of permanent teeth of Baluchi children and compare them with other national and international reported data. Furthermore, to find the effect of gender (male/female) and type of schools (private/public); and relationship with height, weight and body mass index of the children on time of emergence.

Subjects and Methods

This purposive clinical cross-sectional study is a part of nation-wide study conducted to determine the time and sequence of emergence of permanent teeth of Pakistani children. Data was collected from Karachi, Larkana, Lahore, Peshawar and Quetta. The study was supported by a research fund from Higher Education Commission of Pakistan (HEC letter number 20-1631/R&D/09 3041, dated December 29, 2010)). Sample size was calculated using Openepi software (OpenEpi – Toolkit Shell for Developing New Applications) from Karachi data of Khan[1] with 95% confidence interval, 98% power, and difference in mean time of emergence of male and female children of 0.2 years. The sample size for each tooth was calculated and the highest number of about 1250 was taken as the estimated sample size. Systematic cluster random sampling procedure was used to choose the children from schools. List of schools obtained from the Ministry of Education, Baluchistan contained 60 public and 45 private high schools. One number was randomly chosen from 4 numbers, that was 3 and then follows series of number using this number 3, 7, 11. The total numbers of enrolled children in public and private high schools in Quetta were 61,856 and 8,2 25, respectively. Systematic random sampling was utilized to select 25 (14 government and 11 private) schools from the list of schools. A team of two dentists (1 male and 1 female) and 2 assistants (1 male and 1 female) were calibrated and trained against a master trainer of the project (AC). Inter examination reliability was computed using Kappa statistic and it came out 87%. The team visited the selected schools on pre-assigned day and time. Consent forms were sent to the parents before the visit through the school administrations. Eighty three percent of the parents sent the consent to the principals to include them in the study. Children with parent consents and then assented were screened. The children who did not bring the consent, and with any known genetic, congenital disorder, and cleft lip & cleft palate were excluded. On average 30 children were present in a class. Each child of the class was screened and any child who showed just erupted tooth' and had Pakistani nationality was selected from the class room. 'Just erupted tooth' is defined as: a tooth deemed to have emerged if any part of it was visible in the mouth. One thousand two hundred sixty-seven (1267) selected children were examined from those 25 schools. The selected children were examined for the status of emergence (not erupted, just erupted and erupted) for each tooth. Height and weight were

measured and questions regarding food items usually consumed in their family were recorded. This was a country-wide study. The data of Karachi, Larkana and Peshawar are already published. The methodology used in this study was the same as earlier publications. The detailed methodolo-gy is discussed in Khan[1]. Institutional Review Boa-rd's approval was obtained from the Dow Unive-rsity of Health Sciences (No. IRB-B-17/DUHS-10). Data was entered and analyzed using Statistical Pack-age for Social Sciences (ver. 21.0). Mean, median and standard deviation of time of emergence were computed for each tooth. Two independent sampl-es 't' test was used to compare the gender. Pear-on and partial corrections were computed for wei-ght, height, and body mass index.

Results

One thousand two hundred sixty-seven (1267) children from 25 schools fulfilled the criteria of 'just erupted teeth' and were included in the study. Out of total sample of 1267 children, 703 (55.5%) were males and the maximum number of them belonged to grade 6 (n=234, 18.5%), (Figure 1).
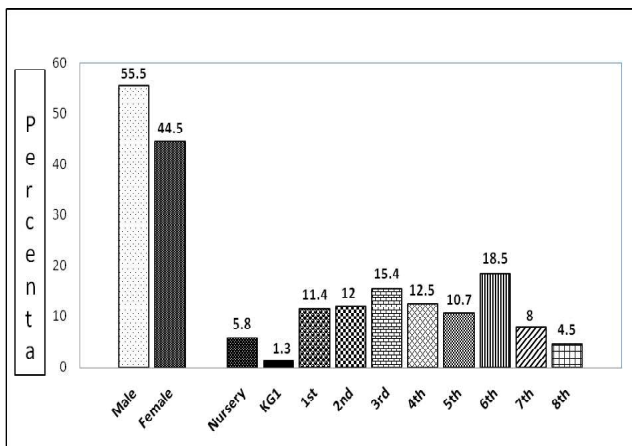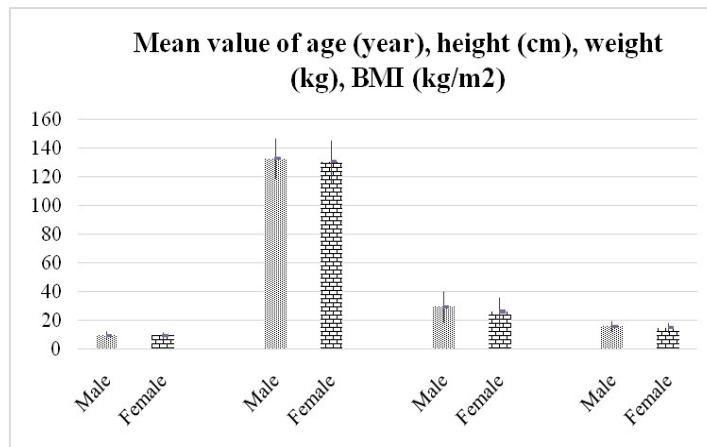
Fig 1. Percentage of Males/Females and Different Classes of the Quetta Children

The mean age, weight, height, and BMI 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. Male children showed significant higher values of height, weight, and BMI as compared to the female children (p<0.05) (Figure 2).

	Age	Height	Weight	BMI
P-value	0.092	0.006	<0.0001	<0.0001

The descriptive statistics (mean, SD and median) of time of emergence of the children is discussed in Table 1. The right first molar (#16) of maxillary jaw showed the lowest mean emergence time of 5.5±0.4 years and the median also showed lowest value with that of 5.5 years. The maximum mean value for this jaw was 12.4±1.3 years for right 2nd molar (#17). The median also showed the highest value of 12.5 years for this tooth. Mean emergence time of right 1st molar (#46) of mandibular teeth was the lowest with 5.6±0.8 years. The median value of this tooth also showed lowest value of 5.5 years. The left 2nd molar (#37) showed the maximum value of mean emergence time for this jaw with 12.1±1.4 years. This tooth also showed the largest median value of 12.2 years.

Table 1 Descriptive statistics of emergence time of all the teeth of Quetta Children

Tooth Number	Number of Cases	Mean±SD	Median	Tooth Number	Number of Cases	Mean±SD	Median
17	44	12.4±1.3	12.5	47	55	11.9±1.2	12
16	15	5.5±0.4	5.5	46	18	5.6±0.8	5.5
15	46	11.4±1.7	11.3	45	38	11.6±1.1	11.8
14	80	9.9±1.3	9.83	44	60	10.3±1.0	10.3
13	101	11.2±1.6	11.41	43	106	9.6±1.2	9.2
12	56	8.4±1.4	8.25	42	55	7.6±1.0	7.4
11	66	7.1±0.7	7.00	41	58	6.4±0.7	6.3
21	61	6.8±0.9	6.7	31	52	6.5±0.8	6.3
22	76	8.4±1.3	8.1	32	53	7.7±1.1	7.4
23	78	11.0±1.4	11.08	33	74	9.5±1.3	9.3
24	79	10.1±1.4	10	34	45	10.1±1.4	9.9
25	34	11.3±1.1	11.1	35	27	11.8±1.1	11.5
26	17	5.8±0.7	5.8	36	15	6.1±0.9	5.8
27	37	12.2±1.3	12.4	37	70	12.1±1.4	12.2

Table 2 shows the comparison of mean emergence time between genders (male/female). Most of the mean values of time of emergence of male children were higher or equal to the female children (23 out of 28 teeth). But none of them was statistically significant ($p > 0.05$). However, the molars of mandibular teeth (#33 & #43) showed significantly ($p < 0.05$) higher mean values of female children than male children.

Table 2. Comparing the time of eruption of male and female children for maxillary and mandibular teeth

Tooth	Maxillary				Mandibular			
	Tooth number	Mean value		p-value	Tooth number	Mean Value		p-value
		Male	Female			Male	Female	
Second molar	17	12.5	12.3	0.3516	37	12.1	12.0	0.7772
First Molar	16	5.5	5.4	0.8143	36	7.2	6.0	0.3035
Second premolar	15	11.5	11.2	0.5307	35	12.0	11.4	0.1698
First premolar	14	9.9	10.0	0.7216	34	10.1	10.0	0.8116
Canine	13	11.5	10.9	0.0546	33	9.1	9.9	0.0075
Lateral incisor	12	8.4	8.4	1.0000	32	7.7	7.7	1.0000
Central incisor	11	7.2	7.0	0.3193	31	6.6	6.4	0.4153
Central incisor	21	7.0	6.7	0.1524	41	6.4	6.3	0.5890
Lateral incisor	22	8.6	8.2	0.1691	42	7.8	7.5	0.2480
Canine	23	11.1	10.9	0.5331	43	9.3	9.9	0.0115
First premolar	24	10.4	9.8	0.0518	44	10.4	10.3	0.6902
Second premolar	25	11.4	11.1	0.4343	45	11.7	11.6	0.8108
First molar	26	7.1	6.6	0.6910	46	6.6	7.6	0.5547
Second molar	27	12.0	12.5	0.2509	47	12.1	11.5	0.0619

Table 3 discusses the effect of schooling system (private vs. public) at the time of emergence. Most of the teeth (21 out of 28 teeth) that is, Every three teeth out of four, showed higher values of time of emergence of private schools' children as compared to public schools. Nine of them were statistically significant (p<0.05). That means one-third of the teeth of children of private schools showed significantly late eruption as compared to public schools.

Table 3. Comparison of mean time of emergence between children of private and public schools

Tooth	Maxillary Tooth number	Mean value Private	Mean value Public	p-value	Mandibular Tooth number	Mean Value Private	Mean Value Public	p-value
Second molar	17	12.7	11.8	0.030	47	11.8	11.9	0.754
First Molar	16	5.7	5.4	0.255	46	5.4	5.8	0.331
Second premolar	15	12.1	10.7	0.004	45	12.0	11.1	0.023
First premolar	14	10.4	9.7	0.016	44	10.5	10.2	0.179
Canine	13	11.5	10.9	0.046	43	10.1	9.1	<0.0001
Lateral incisor	12	8.5	8.4	0.878	42	8.1	7.5	0.266
Central incisor	11	7.1	7.1	0.953	41	6.4	6.4	0.883
Central incisor	21	6.7	6.9	0.431	31	6.6	6.5	0.627
Lateral incisor	22	8.6	8.3	0.463	32	8.2	7.5	0.174
Canine	23	11.5	10.5	0.003	33	10.0	9.1	0.003
First premolar	24	10.1	10.1	0.904	34	10.4	9.9	0.204
Second premolar	25	11.7	10.9	0.039	35	12.0	11.6	0.272
First molar	26	5.8	5.7	0.909	36	6.1	6.1	0.923
Second molar	27	12.2	12.1	0.748	37	12.2	11.9	0.519

Table 4 to Table 6 discuss the correlations between time of emergence and height, weight, and body mass index of the children. Six teeth (#16, #15, #23, #14, #32 and #35) did not show any significant correlation (p>0.05) between height and time of emergence. It table also showed that the half of the teeth did not show any significant partial correlations (p>0.05) between height and time of emergence, keeping the weight of the children constant (Table 4).

Table 4. Pearson and partial correlation (with constant weight) of emergence time with height of the children

Tooth Type	No.of Cases	Pearson Correlation R	p-value	Partial Correlation R	p-value	Tooth Type	No.of Cases	Pearson Correlation R	p-value	Partial Correlation R	p-value
17	44	0.431	0.004	0.295	0.054	47	55	0.527	<0.001	0.352	0.009
16	15	0.006	0.984	0.505	0.065	46	18	0.992	<0.001	0.483	0.049
15	46	0.213	0.156	0.636	<0.001	45	38	0.551	<0.001	0.101	0.551
14	80	0.325	0.003	0.417	<0.001	44	59	0.194	0.141	0.240	0.069
13	101	0.505	<0.001	0.282	0.004	43	106	0.322	0.001	0.425	<0.001
12	56	0.499	.<0.001	0.219	0.108	42	55	0.588	<0.001	0.092	0.507
11	66	0.569	<0.001	0.047	0.713	41	58	0.349	0.004	0.178	0.184
21	61	0.646	<0.001	0.025	0.852	31	51	0.391	0.005	0.286	0.044
22	76	0.552	<0.001	0.289	0.012	32	53	0.254	0.066	0.214	0.128
23	78	0.141	0.219	0.551	<0.001	33	74	0.473	.<0.001	0.362	0.002
24	79	0.274	0.014	0.447	<0.001	34	45	0.441	0.002	0.203	0.186
25	34	0.514	0.002	0.062	0.734	35	27	0.318	0.106	0.189	0.354
26	17	0.807	<0.001	0.597	0.015	36	15	0.776	0.001	0.680	0.007
27	36	0.421	0.011	0.041	0.816	37	70	0.339	0.004	0.301	0.013

Eleven (11) teeth showed insignificant correlation (p>0.05) between time of emergence and weight of the children. While 23 teeth showed insignificant partial correlation (p>0.05) between weight and time of emergence, keeping the weight of the children constant (Table 5).

Table 5. Pearson and partial correlation (with height constant) of emergence time with weight of the children

Tooth Type	No.of Cases	Pearson Correlation		Partial Correlation		Tooth Type	No.of Cases	Pearson Correlation		Partial Correlation	
		R	p-valu	R	p-value			R	p-value	R	p-value
17	32	0.561	0.001	0.320	0.079	47	101	0.382	<0.0001	0.295	0.003
16	22	0.393	0.071	.628	0.002	46	35	0.035	0.843	-035	0.844
15	21	0.331	0.142	0.398	0.082	45	34	0.219	0.214	0.046	0.800
14	74	0.411	<0.001	0.190	0.110	44	105	0.331	. 0.001	0.153	0.121
13	123	0.216	0.017	0.181	0.046	43	130	0.225	0.001	0.126	0.258
12	68	0.415	<0.001	0.447	<0.001	42	83	0.287	0.009	0.162	0.146
11	47	-.046	0.759	-.153	0.310	41	44	0.249	0.168	0.179	0.252
21	58	0.088	0.509	0.123	0.362	31	33	0.172	0.337	0.215	0.238
22	74	0.343	0.003	0.230	0.051	32	74	0.244	0.036	0.190	0.107
23	105	0.206	0.035	0.098	0.322	33	117	0.114	0.222	_0.007	0.943
24	66	0.416	0.001	0.165	0.190	34	104	0.352	<0.0001	0.155	0.119
25	26	0.308	0.126	0.285	0.168	35	30	0.515	0.004	0.445	0.015
26	16	0.707	0.002	0.313	0.256	36	30	0.275	0.142	0.113	0.561
27	42	0.309	0.046	0.175	0.273	37	97	0.276	0.006	0.193	0.061

Ten (10) teeth showed insignificant correlation between BMI and time of emergence (Table 6)

Table 6. Pearson correlation of emergence time with BMI of the children

Tooth Type	No.of Cases	Pearson Correlation		Tooth Type	No.of Cases	Pearson Correlation	
		R	p-value			R	p-value
17	44	0.247	0.106	47	55	00.432	0.001
16	15	0.410	0.129	46	18	0.781	<0.001
15	46	0.388	0.008	45	38	0.183	0.271
14	80	0.001	0.995	44	59	0.307	0.018
13	101	0.376	<0.001	43	106	0.041	0.676
12	56	0.328	0.014	42	55	0.404	0.002
11	66	0.273	0.026	41	58	0.271	0.040
21	61	0.250	0.052	31	51	0.330	0.018
22	76	0.477	<0.001	32	53	0.300	0.029
23	78	0.348	0.002	33	74	0.488	<0.001
24	79	0.391	<0.001	34	45	0.218	0.061
25	34	0.309	0.075	35	27	0.183	0.360
26	17	0.779	<0.001	36	15	0.737	0.002
27	36	0.111	0.520	37	68	0.273	0.024

Table 7 and Table 8 show the comparison of time of eruption of this study with a few latest studies of other countries of four continents. Both the jaws were further divided into 4 quadrants. Quadrant 1 (Q1) contains 8 teeth of right maxillary jaw, while quadrant 2 (Q2) contains 8 teeth of left maxillary jaw. Similarly, 8 teeth of left mandibular jaw is indicated as quadrant 3 (Q3), while 8 teeth of right mandibular jaw is called as quadrant 4 (Q4). Time of eruption of second molars of this study was comparably higher than other studies of Pakistan. However, it was similar to the mean eruption time of other countries. Mean eruption time of first molars were lower than all the reported data shown in the table. Second premolars of the study also showed higher mean value than other Pakistani studies, but not very much different than mean eruption time of other countries. Contrary to the time of eruption of second premolars, the mean eruption time of first premolars were almost the same as compared to the mean eruption time of the other Pakistani studies, but lower than the other countries. Mean eruption time of canine of this study was higher than national studies and almost the

same with the other countries, except the eruption time of Indian children. Mean eruption time of incisors (lateral and central) were almost the same with the other studies, except Indian and Sri Lankan children.

Table 7. Comparison of time of eruption of Maxillary teeth of Baluchi children with national and international reported data

| Tooth | This study | Asia | | | | | | America | Europe | | Africa | |
	Quetta	Karachi	Peshawar	Larkana	India	Iraq	Sri Lanka	Costa Rica	Czech* Republic	Slovakia	South Africa	Egypt
Q1: Second molar	12.4	11.8	9.3	10.1	13.0	12.4	11.5	12.3	12.6	12.3	12.7	11.4
Q1: First molar	5.5	6.6	6.6	6.2	8.1	6.6	6.5	6.6	6.7	6.2	6.3	9.4
Q1: Second premolar	11.4	10.4	10.1	8.4	12.3	10.6	11.3	11.2	10.9	10.8	11.2	10.9
Q1: First premolar	9.9	10.1	9.5	9.0	11.6	9.7	10.8	10.2	9.5	10.1	10.3	10.8
Q1: Canine	11.2	10.9	10.5	9.5	12.1	11.3	10.6	11.2	10.9	10.8	11.2	11.4
Q1: Lateral incisor	8.4	8.4	8.3	7.7	10.4	8.3	8.0	8.3	7.8	7.8	7.8	8.9
Q1: Central incisor	7.1	7.5	7.4	6.8	8.2	7.7	6.9	7.2	7.0	6.5	6.9	8.1
Q2: Central incisor	6.8	7.5	6.7	6.5	6.7	7.5	6.9	7.2	7.0	6.6	6.9	8.1
Q2: Lateral incisor	8.4	8.4	7.9	7.6	10.4	8.5	8.0	8.3	7.8	7.9	7.8	8.9
Q2: Canine	11.0	10.9	10.3	9.6	12.1	11.2	10.6	11.1	10.9	10.8	11.0	11.4
Q2: First premolar	10.1	10.1	9.7	8.8	11.7	9.7	10.8	10.2	9.5	10.1	10.3	10.8
Q2: Second premolar	11.3	10.3	9.8	8.8	12.2	11.5	11.3	11.2	10.9	10.8	11.1	10.9
Q2: First molar	5.8	6.7	7.1	6.2	8.3	6.6	6.5	6.5	6.7	6.2	6.3	9.4
Q2: Second molar	12.2	11.8	11.6	10.1	13.0	12.4	11.5	12.3	12.7	12.4	12.8	11.4

Table 8. Comparison of time of eruption of Mandibular teeth of Baluchi children with national and international reported data

| Tooth | This study | Asia | | | | | | America | Europe | | Africa | |
	Quetta	Karachi	Peshawar	Larkana	India	Iraq	Sri Lanka	Costa Rica	Czech* Republic	Slovakia	South Africa	Egypt
Q3: Second molar	12.1	11.4	11.6	10.0	12.7	12.0	11.7	11.7	12.1	12.0	12.6	11.4
Q3: First molar	6.1	6.6	7.2	6.4	8.4	6.3	6.6	6.3	6.4	5.8	6.1	8.2
Q3: Second premolar	11.8	10.6	10.4	9.3	12.2	10.9	11.2	11.2	10.8	10.8	11.7	10.9
Q3: First premolar	10.1	10.3	10.2	9.0	12.0	10.2	10.6	10.4	9.9	10.0	10.8	10.4
Q3: Canine	9.5	10.1	9.8	9.0	11.7	10.3	11.0	10.3	9.3	9.4	10.2	10.7
Q3: Lateral incisor	7.7	7.9	7.1	7.0	8.9	7.7	8.7	7.5	7.3	7.1	7.1	7.6
Q3: Central incisor	6.5	7.0	6.7	6.2	7.3	6.5	7.5	6.2	6.2	6	6.1	7.5
Q4: Central incisor	6.4	6.9	6.5	6.4	7.4	6.5	7.5	6.2	6.3	6.0	6.1	7.5
Q4: Lateral incisor	7.6	7.8	7.8	6.9	9.1	7.8	8.7	7.4	7.3	7.1	7.1	7.6
Q4: Canine	9.6	10.2	10.1	9.1	11.7	10.5	11.0	10.3	9.3	9.5	10.2	10.7
Q4: First premolar	10.3	10.5	10.2	9.1	11.9	10.3	10.7	10.3	9.9	9.9	10.8	10.4
Q4: Second premolar	11.6	10.7	9.4	8.9	12.2	10.4	11.2	11.2	10.8	11.0	11.7	10.9
Q4: First molar	5.6	6.5	7.0	6.2	8.3	6.2	6.6	6.2	6.3	5.6	6.1	8.2
Q4: Second molar	11.9	11.3	11.8	9.7	12.7	11.8	11.6	11.7	12.1	12.0	12.6	11.4

Discussion

Pakistan consists of five major ethnic groups: (1) Punjabi, living in province of Punjab, (2) Sindhis, living in province of Sindh, (3) Pathan, living in province of Khyber Pakhtunkhwa, (4) Muhajir, living in Southern part of Sindh (Karachi and Hyderabad), and (5) Baluchi, living in Baluchistan. Studies have been reported earlier for the first four ethnic groups as mentioned in the introduction. Ho-wever, as far as authors' knowledge is concern, TET for the chi-ldren of Baluchistan has not been discussed in the literature till now. Therefore, this is the first report from this province. Furthermore, as indicated in the 'Introduction section' that TET should be determined in the nation/ethnic group in which it is going to be used. Baluchis have Iranian ancestor living in Iranian Plateau, which comprises of part of Iran, Pakistan and Afghanistan. Hence, Baluchis are quite different from other ethnic groups of Pakistan, which mainly belong to the Indus River

Civilization and migrants from Arab, Afghanistan and Turkey[6]. Therefore, this study is quite vital on this subject.

Several factors are indicated in the literature for the variation in time of emergence of permanent teeth, including genetic variation, socio-economic status, nutrition intake, health status, environment factors, fluoride use, and anthropometric factors. However, genetic variation is the most significant factor among all other factors[7]. Hence, the genetic background should be kept in mind for any new study on emergence of teeth.

The number of children with a 'just erupted' tooth, included in this study was 1267 from 25 public and private schools. As it is mentioned in the literature that only about 20% of all the screened children showed at least a 'just erupted' tooth. Ther-efore, at least 6000 children were screened to get that number of cases for this survey. Hence this study is quite reliable for estimation and can be used as standard for time of emergence of Baluchi children.

This study showed that the emergence time of the right 1st molar (#16) of maxillary jaw and right 1st molar (#46) of mandibular jaw showed the lowest values of 5.5 years and 5.6 years, respectively. Majority of the studies indicate that 1st molars erupt most of the times earlier than other teeth in the oral cavity[8]. However, the outcome of this study showed lowest early eruption time for the of 1st molar than all the other studies mentioned above, except Webb et al[9]. The maximum mean values of emergence time belonged to right and left 2nd maxillary molars (#17 and #27) with values of 12.4 years and 12.2 years, respectively. Shahid et al[10] showed later emergence time than our study. Comparing the emergence time of Baluchi children with other reported Pakistani ethnic groups, studies showed the variation between earliest emergences of 1st molars and late emergence time of 2nd molars was the larger than Sindhi, Mohajir and Pakhtoon's children.

The outcomes of this study showed early eruption of teeth as compared to American Dental Association (ADA) chart for permanent teeth's standard. The mean eruption times of central incisor, first pre-molar, and first molar of maxillary jaw were lesser than the lower value of ranges indicated in the ADA chart. In addition, the mean eruption time of first molar of the mandibular jaw was also lesser than the lower limit of the range. The remaining values of this study were in the lower side the ranges showed in the ADA chart.

In most of the teeth (every 3 out of 4) the time of emergence of females was lesser than males, but the differences in mean values were very small (insignificant). These results are in agreement with Gutiérrez-Marín[11], Soesilawati[12], and Elkhatib[13]. However, many other studies[14-17] showed significantly early emergence for female as compared to male children for most of the teeth. Nevertheless, Khan[18], indicated significantly early emergence among male children than female children. Esan[7] suggested that the reasons for the trend of early emergences among females were due to early maturation of females and better shielded environmental influences than male counter parts.

This study showed that children of private schools had the tendency of late emergence as compared to children of public schools, with minor differences (statistically insignificant). However, the children from Karachi showed mostly early emergence of private schools' children than public schools' children. The enrollments in private and public schools of Karachi are very well segregated by socio-economic groups. Most of the middle, upper-middle and high socio-economic groups' children are enrolled in private schools, and furthermore, very few public schools are located in those areas. But this is not the case in Quetta. In Quetta, standard and model public schools are located in all over the city and there is no major segregation of socio-economic groups between private and public schools. However, this discrepancy of Karachi and Quetta data should be due to some other factors, which could be further studied.

This study showed that the height of the children was significantly correlated with time of emergence in majority of teeth (23 out of 28), while only 17 teeth showed the correlation of weight of the children with time of emergence. Furthermore, half the children showed partial correlation between

emergence teeth with height, keeping the weight controlled, while only few (5 out of 28) showed partial correlation with weight, keeping the height controlled. Therefore, the results indicated that the time of emergence is delayed with increasing height, irrespective of the heavy or lightweight children. However, emergence time delayed with weight, if the child is also tall, but has no relationship with weight if the child is short. These mixed outcomes in the correlations effect on the correlation of emergence of time with BMI and only 14 teeth showed significantly positive correlation.

One of the major limitations of the study is that the study does not involve the radiographic analysis, which could also have given the information, related to hypodontia and impacted teeth. However, almost all the studies on this topic are based on direct screening of teeth. Therefore, this methodology was adopted for comparison with other national/ethnical studies. In addition, the children of rural areas of Quetta are not included in the study. It was quite difficult to arrange the data collection in the schools of rural areas. But since the culture and dieting habits of rural and urban areas are not very much different, therefore, this limitation will not sig-nificantly affect the outcome of the study. Other fa-ctors such as dietary habits of the family and her-editary could also affect on the chronological age and teeth development.

This study showed that the canines, second premolars, and second molars erupted later than the study conducted on Mohajirs[1], Pathans[2], and Sindhis[3]. These teeth erupt later than first molars, central and lateral incisors and first pre-molars. It may be due to the genetic background of Baluchi children. Baluchis are mainly migrants from South-ern Iran. Moslemi[19] showed a close result for Iranian children with these findings.

Genetic is also one the major factors affect the eruption of teeth. Badruddin et al[20] in a review article concluded that many studies have shown that the genetic contributed significantly in the course of tooth eruption in many longitudinal studies, both for twins and individual children. He further stated that the time and sequence of erupt-

ion with symmetry and asymmetry of teeth are related with genetic factor. Since the data were collected from regular schools, so the children who do not attend the schools or attend the religious schools are not included in the study.

Since the above-mentioned factors are not incl-uded in this study. Therefore, the outcome should be read with caution. However, in all such studies, conducted on this subject follow the same meth-odology which have been applied over here. Theref-ore, this study could be comparable with other int-ernational studies. Nevertheless, since the sample size is large enough, hence these results could be used as the standard for the time of eruption of Ba-luchi children and should be included in the text books of dentistry. It is recommended that a cross-sectional household study, including the religious schools should be conducted.

Conclusions

Mean eruption time of permanent teeth of this study was higher than other national studies, but close to the other Asian countries, except the eru-ption time of Indian children. The eruption time of female children were insignificantly earlier than ma-le children, which do not agree with other Ameri-can, European, and African children, but do agree with Indian and other Pakistani ethnic groups. Fur-thermore, the eruption of teeth of private schools' children were delayed as compared to public scho-ols' children, but that do not agree with other stud-ies. This study also showed that time of emerge-nce is delayed with increasing height, irrespective of the heavy or lightweight children. However, emer-gence time delayed with weight, if the child is also tall, but has no relationship with weight if the child is short.

Conflict of Interest

Authors have no conflict of interest and no grant/funding from any organization.

References

1. Khan N. Emergence time of permanent teeth in Pakistani children. Iranian J Public Health 2011; 40(4):63-73. Available from: https://www.ncbi.nlm .nih.gov/pmc/articles/PMC3481734/pdf/i jph-40-65. pdf. Accessed on: 13th July 2023.

2. 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(4):154-61. [DOI:10.25301/JPDA.283.149]. Available from: https://www.jpda.com.pk/oral-profile-of-patient-effected-by-chikungunya-virus-a-case-report-2/. Accessed on: 13th July 2023.

3. Khan N, Abbasi SA, Khan H, Baloch MR, Chohan A. Time of Emergence of permanent teeth of the children of Larkana, Pakistan.[Online] Pak Orthodontic J 2022;14(1):21-31. Available from: https://poj.org.pk/index.php/poj/article/view/321. Accessed on 13th July 2023.

4. Shourie KL. Emergence age of teeth in India. [Online] Ind J Med Res. 1946; 34 (1): 105-118. Available from: https://pubmed.ncbi.nlm.nih.gov/20999659/. Accessed on: 13th July 2023.

5. Mahmood A, Hamid W, Jabbar A, Farooq A. Ages and sequence of eruption of permanent teeth in a sample of Pakistani school children. [Online] Pakistan Ort hodontic Journal. 2010;2(2):52-9. Available from: https://poj.org.pk/index.php/poj/article/view/4. Acces sed on: 13th July 2023.

6. Spooner B. Baluchistan: Geography, History, and Ethnography. Encyclopædia Iranica 1988; 3(6): 598-632, [online] "Baluchistan: Geography, History, and Ethnography" by Brian Spooner (upenn.edu) Accessed on: 13th July 2023.

7. Esan TA, Mothupi KA, Schepartz LA. Permanent tooth emergence: Timing and sequence in a sample of Black Southern African children. Am J Physical Anthropology. 2018;167(4):827-39. [DOI: 10.1002/ajpa.23714]. Available from: https://online library.wiley.com/doi/10.1002/ajpa.23714. Accessed on: 13th July 2023.

8. Valenzuela Ramos MR, Ojeda Gómez R, Correia F. Dental emergence related to the indicator weight for age. [online] Advances odontoestoma tología 2018;34(4):193-8. Available from: https://scielo.isciii.es/pdf/odonto/v34n4/0213-1285-odonto-34-4-193.pdf. Accessed on 13th July 2023.

9. Webb E, Woods L, Stewart C, Dunlop PF, Tangis J, Stephens J, Dennison E. Timings of Permanent Tooth Emergence in Children of Rural Vanuatu, Melanesia. [Online]. Pacific Health Dialog. 2021;21(8):510-8. [DOI: 10.26635/phd.2021.143%20]. Available from: https://pacific healthdia log.nz/index.php/phd/article/view/110. Accessed on: 13th July 2023.

10. Shahid H, Hassan S, Shaikh AA. Eruption of permanent teeth: Assessment of eruption of permanent teeth according to gender in local population. The Professional Medical Journal 2018;25(11):1 741-6. [DOI:10.29309/TPMJ/18.4633]. Available from: http://theprofesional.com/index.php/tpmj/artic le/view/761. Accessed on: 13th July 2023.

11. Gutiérrez-Marín N, Soto AL, Rivas JC. Age and Sequence of Emergence of Permanent Teeth in a Population of Costa Rican Schoolchildren.[Online] Odo-vtos-International Journal of Dental Sciences 20-21:325-32. Availablefrom:https://www.revistas.ucr.ac.cr/index.php/Odontos/article/view/43991/44185. Accessed on 13th July 2023.

12. Soesilawati P, Rahmawati NA, Raharjo YI, Aprilia T, Salsabila KI, Phen A, Yuliantoro R, Wahluyo S, Alias A. Comparison of Permanent Teeth Emergence by Chronological Age in Indonesian Children. Malaysian J Med Health Sc 2021;17:1-4. [DOI: 10.20473/j.djmkg.v52.i2.p100-104]. Available from: https://e-journal.unair.ac.id/MKG/article/view/4487. Accessed on: 13th July 2023.

13. Elkhatib M, El-Dokky N, Nasr R. The Emergence Sequence of Primary and Permanent Teeth in a Group of Children. Egyptian Dent J. 2021; January,67,41:54. [DOI:10.3390/diagnostics12030 606]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8947037/pdf/diagnostics-12-00606.pdf. Accessed on: 13th July 2023.

14. Šindeláøová R, Žáková L, Broukal Z. Standards for permanent tooth emergence in Czech children. BMC Oral Health 2017;17(1):1-8. [DOI:10.1186/s12903-017-0427-9]. Available from: http-s://bmcoralhealth.biomedcentral.com/articles/10.1186/s12903-017-0427-9. Accessed on: 13th July 2023.

15. Fekonja A. Evaluation of the eruption of permanent teeth and their association with malocclusion. [Online]. Clinical and Experimental Dental Research. 2022;8(4):836-42. Accessed on: 13th July 2023.

16. Vithanaarachchi N, Nawarathna L, Wijeyeweera L. Standards for permanent tooth emergence in Sri Lankan children.[Online] Ceylon Medical Journal. 2021 Jul 30;66(1). Available from: https://onlinelib rary. wiley.com/doi/full/10.1002/cre2.544. Accessed on 13th July 2023.

17. 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 [Online]. Curr Sci Int. 2021;10(02):265-75. Available from: https://www.curresweb.com/csi/csi/2021/csi.2021.10.2.25.pdf. Accessed on: 13th July 2023.

18. Khan AS, Nagar P, Singh P, Bharti M. Changes in the Sequence of Emergence of Permanent Teeth; Correlation between Chronological and Dental Age and Effects of Body Mass Index of 5–15-year-old Schoolchildren. Inter J Clin Pediatric Dent. 2020 Jul;13(4):368. [DOI: 10.5005/jp-journals-100 05-1797]. Available from: https://www.ncbi.nlm.nih .gov/pmc/articles/PMC7586486/. Accessed on: 13th July 2023.

19. Moslemi M. An epidemiological survey of the time and sequence of eruption of permanent teeth in 4–15 year olds in Tehran, Iran. International journal of paediatric dentistry. 2004 Nov;14(6):432-8. [DOI: 10.1111/j.1365-263X.2004.00586.x.]. Available from: https://pubmed.ncbi.nlm.nih.gov/1552 5312/. Accessed on: 13th July 2023.

20. Badruddin IA, Auerkari EI, Darwita RR, Setiawati F, Adiatman M, Maharani DA, et al. Genetic Aspects of Tooth Eruption: A Systematic Review. [Online]. Journal of International Dental and Medical Research. 2020;13(4):1585-91. Available from: https:/ /www.proquest.com/openview/d6872d2f6eca095 72c 88bdfcd7d7e1d6/1?pq-origsite=gscholar&cbl= 1036416. Accessed on: 13th July 2023.