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The Morphology of the Primary Dental Arch in Shanghai, China : 72 Cases of Normal Occlusion

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Summary

To obtain the dimensional data of the dental casts of growing and developing Chinese children, and to compare the data to the Japanese, we have performed dental examinations on children in the kindergarten attached to Shanghai Teachers' University in Shanghai since 1996. As study materials, dental casts obtained between 1996 and 1999 from 72 Chinese children aged 3 to 6 years with normal primary occlusion were used to evaluate the mesio–distal crown diameters of the primary teeth, the sizes of the primary dental arch, and the standard values and frequency distributions of primary occlusion.

1. Males showed higher values in mesio–distal crown diameters in deciduous teeth, and the size of dental arch than females.
2. In regard to the interdental spaces both in the maxilla and mandible, primate and developmental spaces together were most frequently observed.
3. In regard to the occlusal relationship, the incidence of terminal planes was higher in the order of Vertical type > Mesial step type > Distal step type, and the incidence of primary canine occlusal relationship was higher in the order of type Ⅰ > type Ⅲ > type Ⅱ.
4. The items that were thought to be characteristic of Chinese children were the frequency of only primate spaces, and the incidence of the Mesial step type of terminal plane and type Ⅲ primary canine occlusal relationship.

Introduction

To obtain appropriate occlusal development in clinical pedodontics, it is important to understand the conditions of the mesio–distal crown diameters of the primary teeth, primary dental arch width and length, and primary occlusion, which are important information factors to predict future permanent dentition.

However, because the number of Chinese dentists for the population of China is markedly small,

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precise dental investigation is difficult, and there have been no reports of the establishment of standard values for the whole of China.

We performed the investigation of the survey of dental diseases in Shijiazhuang city, China in cooperation with the hygiene agency in Hebei province in China between 1989 and 1992, and evaluated primary dentition in children with normal occlusion[1]. Furthermore, we have performed dental examinations on children in the kindergarten attached to Shanghai Teachers' University in Shanghai as joint research with the Department of Pediatric Dentistry in the School of Stomatology at Tongji University (former Shanghai Railroad University) since 1996, and evaluated the primary dental casts obtained in 1996 using the same method as was used for the evaluation of the primary dentition in Shijiazhuang city[2].

To obtain the dimensional data of the dental casts of growing and developing Chinese children, and to compare the data to the Japanese. In this study, we performed investigation of the mesio–distal crown diameters of the deciduous teeth, primary dental arch width and length, and primary occlusal relationship in Chinese children using primary dentition casts obtained from children in the kindergarten attached to Shanghai Teachers' University in Shanghai between 1996 and 1999.

Materials and Methods

We performed dental examinations and took impressions of the dentition in 749 children (390 males and 359 females)in the kindergarten attached to Shanghai Teachers' University in Shanghai between 1996 and 1999 (Table 1). As study materials, the dental casts of 72 children (37 males and 35 females, including 43 children that were investigated in 1996) aged 3 to 6 years, which were selected following the Japanese Society of Pediatric Dentistry (J. S. P. D.) standard for normal primary occlusion[3], were used for the measurement of the mesio–distal crown diameters of the deciduous teeth, primary dental arch width and length, arch height, interdental spaces, the conditions of the deciduous second molars, and primary canine occlusal relationship. Regarding the mesio–distal crown diameters of the deciduous teeth, primary dental arch width and length, and arch height, we measured the mean values, and regarding interdental spaces, the conditions of the deciduous second molars, and primary canine occlusal relationship, we investigated the incidence (Fig.1).

Considering changes in the size of the dental arch with growth, we divided the children into a younger group, aged between three and four years, and an older group, aged between five and six years. We used t–test for the statistical analysis of the size of the dental arch, and used the Chi–squared test for the analysis of the incidence.

Regarding casts obtained from the same child

Table 1 : Materials

Children in Shanghai	Male 390	Female 359	Total 749
Normal occlusion	37	35	72
Younger group (3·4 years)	22	22	44
Older group (5·6 years)	15	13	28

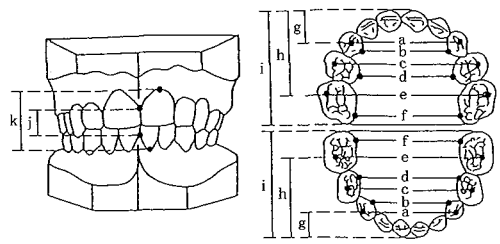

Fig. 1 : Measurement points

in a different year of examination, we took the cast obtained in the first year as the study material.

Results

1. Mesio-distal crown diameters of the deciduous teeth

As shown in Table 2, sex differences were observed only in the mandibular central incisor.

Table 2: Mesio-distal crown sizes of deciduous teeth

Deciduous teeth		Male (n=37) Mean ± S. D. (mm)	C. V. (%)	female (n=35) Mean ± S. D. (mm)	C. V. (%)	Sex differences
Maxillary	Central Incisor	6.72 ± 0.39	5.9	6.62 ± 0.34	5.1	NS
	Lateral Incisor	5.42 ± 0.25	4.6	5.40 ± 0.34	6.3	NS
	Canine	6.62 ± 0.34	5.2	6.56 ± 0.31	4.8	NS
	First Molar	7.49 ± 0.39	5.2	7.32 ± 0.41	5.6	NS
	Second Molar	9.22 ± 0.44	4.8	9.19 ± 0.47	5.1	NS
Mandibular	Central Incisor	4.19 ± 0.33	7.8	4.04 ± 0.28	7.1	*
	Lateral Incisor	4.70 ± 0.30	6.5	4.61 ± 0.29	6.4	NS
	Canine	5.85 ± 0.28	4.9	5.79 ± 0.29	4.9	NS
	First Molar	8.10 ± 0.45	5.5	8.08 ± 0.41	5.1	NS
	Second Molar	10.09 ± 0.42	4.2	10.01 ± 0.56	5.6	NS

* : $p < 0.05$

2. Size of the dental arch

The mean values are shown in Table 3.

Sex differences in the group of younger children were observed in the maxillomandibular E–E (e), maxillary CL–CL (b), D–D (c), and DL–DL (d), and mandibular A–CC (g) and A–ED (i). Those in the group of older children were observed in the maxillomandibular DL–DL (d) and EL–EL (f), and maxillary CC–CC (a), CL–CL (b), D–D (c), A–CC (g), and A–ED (i).

3. Interdental spaces

Regarding sex differences, females showed a significantly higher incidence of maxillary primate spaces than males, whereas males with both primate and developmental spaces in the maxilla showed a higher incidence than females (Table 4).

4. Terminal planes and primary canine occlusal relationship

As shown in Table 5, no sex differences in any types of terminal planes or primary canine occlusal relationship were observed.

Regarding sex differences in the incidence of the combinations of terminal plane types and primary canine occlusal relationships, females showed a significantly higher incidence of Distal step–type Ⅱ, and Distal step–type Ⅲ than males (Table 6).

No sex differences in the incidence of the combinations of bilateral terminal plane types were observed (Table 7).

Table 3–1 : Arch dimensions of deciduous dentition (3–4 years)

		Measurement points	Male (n=22) Mean ± S. D. (mm)	Female (n=22) Mean ± S. D. (mm)	Sex differences
Arch width	Maxillary	a	31.14 ± 1.71	30.22 ± 1.56	NS
		b	25.72 ± 1.69	24.70 ± 1.58	**
		c	40.04 ± 2.13	38.51 ± 2.46	**
		d	28.53 ± 1.90	27.24 ± 1.65	**
		e	46.85 ± 2.57	45.30 ± 2.42	**
		f	30.87 ± 2.03	29.89 ± 1.61	NS
	Mandibular	a	23.32 ± 1.80	22.82 ± 1.40	NS
		b	19.44 ± 1.54	18.78 ± 1.40	NS
		c	30.94 ± 1.92	30.14 ± 1.33	NS
		d	24.52 ± 1.61	24.03 ± 1.34	NS
		e	39.58 ± 2.16	38.37 ± 1.81	*
		f	28.55 ± 1.97	28.14 ± 1.45	NS
Arch length	Maxillary	g	8.07 ± 1.09	7.76 ± 1.09	NS
		h	21.80 ± 3.02	21.35 ± 1.09	NS
		i	28.45 ± 1.47	27.78 ± 1.28	NS
	Mandibular	g	5.22 ± 0.87	4.69 ± 0.92	*
		h	18.16 ± 2.65	17.96 ± 2.06	NS
		i	25.25 ± 1.47	24.42 ± 0.90	*
Arch height		j	3.87 ± 1.15	3.76 ± 1.56	NS
		k	7.50 ± 1.57	7.25 ± 1.04	NS

* : $P < 0.05$
** : $P < 0.01$

Table 3–2 : Arch dimensions of deciduous dentition (5–6 years)

		Measurement points	Male (n=15) Mean ± S. D. (mm)	Female (n=13) Mean ± S. D. (mm)	Sex differences
Arch width	Maxillary	a	31.77 ± 2.03	30.23 ± 1.49	*
		b	26.00 ± 1.69	24.65 ± 1.58	*
		c	40.39 ± 2.23	38.45 ± 1.82	*
		d	29.09 ± 1.89	27.19 ± 1.86	*
		e	46.95 ± 4.29	45.20 ± 2.32	NS
		f	31.76 ± 2.02	29.92 ± 1.74	*
	Mandibular	a	23.87 ± 1.21	23.01 ± 1.91	NS
		b	19.74 ± 1.12	19.11 ± 1.84	NS
		c	31.43 ± 1.75	30.32 ± 2.06	NS
		d	25.39 ± 1.65	23.79 ± 1.81	*
		e	40.03 ± 2.46	38.23 ± 2.32	NS
		f	29.59 ± 1.41	27.72 ± 1.99	**
Arch length	Maxillary	g	8.20 ± 1.04	7.35 ± 0.82	*
		h	22.34 ± 3.84	21.57 ± 1.74	NS
		i	29.14 ± 1.90	27.84 ± 1.11	*
	Mandibular	g	5.10 ± 0.87	4.78 ± 0.88	NS
		h	18.33 ± 3.55	18.57 ± 1.40	NS
		i	25.84 ± 1.89	24.99 ± 1.39	NS
Arch height		j	3.31 ± 1.13	3.82 ± 0.85	NS
		k	7.45 ± 1.18	7.98 ± 0.88	NS

* : $P < 0.05$
** : $P < 0.01$

Table 4: Inter dental spaces

			Male n=37	%	Female n=35	%	Sex differences
Maxillary	Spaced type	Primate	2	2.7	10	14.3	**
		Primate + Developmental	34	45.9	21	30.0	*
		Developmental	0	0.0	1	1.4	NS
	Closed type	close	1	1.4	3	4.3	NS
Mandibular	Spaced type	Primate	4	5.4	5	7.1	NS
		Primate + Developmental	28	37.8	19	27.2	NS
		Developmental	2	2.7	5	7.1	NS
	Closed type	close	3	4.1	6	8.6	NS

* : $P < 0.05$
** : $P < 0.01$

Table 5: Terminal plane and primary canine occlusion

	Terminal plane			Primary canine occlusion		
	Vertical %	Distal step %	Mesial step %	type I %	type II %	type III %
Male	67.6	5.4	27.0	44.6	12.2	43.2
(n = 37)	(50)	(4)	(20)	(33)	(9)	(32)
Female	58.6	11.4	30.0	48.6	14.3	37.1
(n = 35)	(41)	(8)	(21)	(34)	(10)	(26)
Total	63.2	8.3	28.5	46.5	13.2	40.3
(n = 72)	(91)	(12)	(41)	(67)	(19)	(58)
Sex differences	NS	NS	NS	NS	NS	NS

Table 6: Relationship between terminal planes and primary canine occlusion

Terminal plane		Primary canine occlusion	Male n = 37 %	Female n = 35 %	Sex differences
Vertical	–	type I	33.8	35.7	NS
Vertical	–	type II	10.8	7.1	NS
Vertical	–	type III	23.0	15.7	NS
Distal step	–	type I	4.0	1.5	NS
Distal step	–	type II	1.3	7.1	*
Distal step	–	type III	0.0	5.7	*
Mesial step	–	type I	6.8	8.6	NS
Mesial step	–	type II	0.0	0.0	NS
Mesial step	–	type III	20.3	18.6	NS

* : $P < 0.05$

Table 7 : Combination of bilateral terminal planes

Types	Male (n = 37)	%	Female (n = 35)	%	Sex diferences
Vertical – Vertical	21	56.8	16	45.7	NS
Vertical – Distal step	4	10.8	5	14.3	NS
Vertical – Mesial step	4	10.8	4	11.4	NS
Distal step – Distal step	0	0.0	1	2.9	NS
Mesial step – Mesial step	5	13.5	6	17.1	NS
Mesial step – Distal step	3	8.1	3	8.6	NS

Discussion

1. Mesio–distal crown diameters of the deciduous teeth

There have been reports of racial differences in the mesio–distal crown diameters of some deciduous teeth [2]. Furthermore, we reported that there were slight differences in those values due to regional characteristics even in the same race [4]. Generally, male tend to show slightly larger values than females [2], and males in this study also tended to show larger mesio–distal crown diameters of the deciduous teeth than females (Table 8).

Table 8 : Mesio–distal crown sizes of deciduous teeth in different races

Deciduous teeth		Male			Female		
		Japanese	Chinese (Shijiazhuang city)	Chinese (Shanghai city)	Japanese	Chinese (Shijiazhuang city)	Chinese (Shanghai city)
		(n = 83)	(n = 36)	(n = 37)	(n = 75)	(n = 19)	(n = 35)
		Mean ± S. D. (mm)	Mean ± S. D. (mm)	Mean ± S. D. (mm)	Mean ± S. D. (mm)	Mean ± S. D. (mm)	Mean ± S. D. (mm)
Maxillary	Central Incisor	6.65 ± 0.38	6.60 ± 0.37	6.72 ± 0.39	6.50 ± 0.37	6.51 ± 0.36	6.62 ± 0.34
	Lateral Incisor	5.50 ± 0.35	5.45 ± 0.49	5.42 ± 0.25	5.35 ± 0.37	5.35 ± 0.26	5.40 ± 0.34
	Canine	6.67 ± 0.43	6.59 ± 0.44	6.62 ± 0.34	6.54 ± 0.33	6.42 ± 0.25	6.56 ± 0.31
	First Molar	7.36 ± 0.41	7.40 ± 0.41	7.49 ± 0.39	7.19 ± 0.40	7.12 ± 0.37	7.32 ± 0.41
	Second Molar	9.30 ± 0.41	9.01 ± 0.46	9.22 ± 0.44	9.22 ± 0.50	8.83 ± 0.44	9.19 ± 0.47
Mandibular	Central Incisor	4.24 ± 0.27	4.16 ± 0.30	4.19 ± 0.33	4.11 ± 0.29	4.02 ± 0.24	4.04 ± 0.28
	Lateral Incisor	4.78 ± 0.34	4.62 ± 0.31	4.70 ± 0.30	4.66 ± 0.29	4.63 ± 0.26	4.61 ± 0.29
	Canine	5.82 ± 0.34	5.78 ± 0.36	5.85 ± 0.28	5.72 ± 0.28	5.62 ± 0.23	5.79 ± 0.29
	First Molar	8.23 ± 0.48	8.14 ± 0.47	8.10 ± 0.45	8.08 ± 0.45	7.86 ± 0.33	8.08 ± 0.41
	Second Molar	10.34 ± 0.51	9.97 ± 0.46	10.09 ± 0.42	10.12 ± 0.55	9.69 ± 0.42	10.01 ± 0.56

Almost no differences were observed between Japanese children [3] and children in Shanghai city, and differences between children in Shijiazhuang city investigated in our study [1] and children in Shanghai city were observed only in the maxillomandibular deciduous first molars. Therefore, we considered that there were no differences that showed racial characteristics in the mesio–distal crown diameters of the deciduous teeth between Japanese children and Chinese children.

2. Size of the dental arch

It has been reported that deep overbite was characteristic of primary dentition in Chinese children, and the incidence of deep overbite tended to decrease with age [5], shifting to normal occlusion in most cases, and deep overbite was observed in a few children after successional replacement with permanent incisors. However, we excluded deep overbite from our investigation, because we selected dental casts with normal primary occlusion following the Japanese Society of Pediatric Dentistry (J. S. P. D.) standard for normal primary occlusion [3] to investigate the mean values in this study.

In comparing the results in this investigation to the size of the dental arch in Japanese children [3], both males and females in the group of younger children in Shanghai city showed low values exceeding–1 S. D. in the mandibular D–D (c) and A–E (h) (Table 9–1). Males in the group of older children

Table 9–1 : Arch dimensions of deciduous dentition in different races (3–4 years)

			Male			Female		
			Japanese	Chinese (Shijiazhuang city)	Chinese (Shanghai city)	Japanese	Chinese (Shijiazhuang city)	Chinese (Shanghai city)
		Measurement points	(n = 69) Mean ± S. D. (mm)	(n = 26) Mean ± S. D. (mm)	(n = 22) Mean ± S. D. (mm)	(n = 64) Mean ± S. D. (mm)	(n = 11) Mean ± S. D. (mm)	(n = 22) Mean ± S. D. (mm)
Arch width	Maxillary	a	30.39 ± 1.51	30.57 ± 1.62	31.14 ± 1.71	29.31 ± 1.30	29.74 ± 1.88	30.22 ± 1.56
		b	24.81 ± 1.31	25.06 ± 1.58	25.72 ± 1.69	23.85 ± 1.21	24.55 ± 1.62	24.70 ± 1.58
		c	39.52 ± 1.95	39.88 ± 1.88	40.04 ± 2.13	37.64 ± 2.35	38.46 ± 2.05	38.51 ± 2.46
		d	27.62 ± 1.57	28.54 ± 1.83	28.53 ± 1.90	26.72 ± 1.99	27.33 ± 1.94	27.24 ± 1.65
		e	46.62 ± 1.95	47.16 ± 2.14	46.85 ± 2.57	44.92 ± 1.63	45.57 ± 1.30	45.30 ± 2.42
		f	30.08 ± 1.76	32.32 ± 2.25	30.87 ± 2.03	28.71 ± 1.42	30.22 ± 1.81	29.89 ± 1.61
	Mandibular	a	23.39 ± 1.30	23.15 ± 1.69	23.32 ± 1.80	22.63 ± 1.16	22.84 ± 1.40	22.82 ± 1.40
		b	19.12 ± 1.15	19.09 ± 1.42	19.44 ± 1.54	18.22 ± 1.11	19.23 ± 1.50	18.78 ± 1.40
		c	33.41 ± 1.53	32.42 ± 2.38	30.94 ± 1.92	32.09 ± 1.45	32.26 ± 2.18	30.14 ± 1.33
		d	25.17 ± 1.45	25.42 ± 1.74	24.52 ± 1.61	24.16 ± 1.25	23.86 ± 2.72	24.03 ± 1.34
		e	38.99 ± 1.83	39.66 ± 1.53	39.58 ± 2.16	37.72 ± 1.47	38.54 ± 1.63	38.37 ± 1.81
		f	28.69 ± 1.66	29.43 ± 1.35	28.55 ± 1.97	27.58 ± 1.37	28.75 ± 1.32	28.14 ± 1.45
Arch length	Maxillary	g	8.50 ± 0.92	7.68 ± 1.11	8.07 ± 1.09	8.02 ± 0.92	7.00 ± 0.80	7.76 ± 1.09
		h	23.15 ± 1.41	21.35 ± 1.95	21.80 ± 3.02	22.52 ± 1.29	20.61 ± 1.19	21.35 ± 1.99
		i	28.54 ± 1.82	27.67 ± 1.86	28.45 ± 1.47	28.24 ± 1.10	26.79 ± 1.06	27.78 ± 1.28
	Mandibular	g	5.40 ± 0.81	4.77 ± 0.91	5.22 ± 0.87	5.18 ± 0.82	4.13 ± 0.68	4.69 ± 0.92
		h	19.50 ± 1.23	18.06 ± 1.78	18.16 ± 2.65	19.15 ± 1.09	17.15 ± 0.96	17.96 ± 2.06
		i	25.82 ± 1.18	24.90 ± 1.81	25.25 ± 1.47	25.37 ± 1.21	23.79 ± 1.35	24.42 ± 0.90
Arch height		j	3.51 ± 0.76	4.00 ± 1.00	3.87 ± 1.15	3.28 ± 0.91	3.55 ± 0.85	3.76 ± 1.56
		k	7.83 ± 0.91	7.80 ± 1.03	7.50 ± 1.57	7.40 ± 1.00	7.54 ± 0.81	7.25 ± 1.04

Table 9–2 : Arch dimensions of deciduous dentition in different races (5–6 years)

			Male			Female		
			Japanese	Chinese (Shijiazhuang city)	Chinese (Shanghai city)	Japanese	Chinese (Shijiazhuang city)	Chinese (Shanghai city)
		Measurement points	(n = 14) Mean ± S. D. (mm)	(n = 10) Mean ± S. D. (mm)	(n = 15) Mean ± S. D. (mm)	(n = 9) Mean ± S. D. (mm)	(n = 8) Mean ± S. D. (mm)	(n = 13) Mean ± S. D. (mm)
Arch width	Maxillary	a	31.18 ± 1.93	30.71 ± 0.81	31.77 ± 2.03	29.95 ± 1.62	29.20 ± 1.57	30.23 ± 1.49
		b	25.51 ± 1.84	25.35 ± 1.18	26.00 ± 1.69	24.69 ± 1.39	23.56 ± 1.44	24.65 ± 1.58
		c	40.33 ± 2.67	39.36 ± 1.61	40.39 ± 2.23	38.81 ± 1.46	37.38 ± 2.66	38.45 ± 1.82
		d	28.60 ± 2.30	28.48 ± 1.40	29.09 ± 1.89	27.49 ± 1.53	26.80 ± 1.62	27.19 ± 1.86
		e	47.60 ± 2.84	47.66 ± 1.65	46.95 ± 4.29	46.22 ± 1.35	44.11 ± 3.09	45.20 ± 2.32
		f	31.16 ± 2.31	32.22 ± 2.10	31.76 ± 2.02	29.82 ± 1.14	30.39 ± 2.35	29.92 ± 1.74
	Mandibular	a	23.91 ± 1.65	23.90 ± 1.42	23.87 ± 1.21	22.21 ± 1.85	22.49 ± 1.15	23.01 ± 1.91
		b	19.82 ± 1.34	19.62 ± 1.64	19.74 ± 1.12	18.61 ± 1.42	18.31 ± 0.71	19.11 ± 1.84
		c	34.25 ± 2.23	31.58 ± 2.16	31.43 ± 1.75	32.74 ± 1.42	29.90 ± 2.19	30.32 ± 2.06
		d	25.94 ± 1.78	25.48 ± 2.05	25.39 ± 1.65	24.71 ± 1.25	24.30 ± 1.74	23.79 ± 1.81
		e	39.61 ± 2.41	40.14 ± 2.16	40.03 ± 2.46	38.70 ± 1.34	37.24 ± 2.23	38.23 ± 2.32
		f	29.62 ± 1.72	29.67 ± 1.77	29.59 ± 1.41	28.46 ± 1.43	28.49 ± 2.60	27.72 ± 1.99
Arch length	Maxillary	g	8.20 ± 1.05	7.14 ± 0.95	8.20 ± 1.04	7.86 ± 0.72	7.20 ± 1.30	7.35 ± 0.82
		h	23.14 ± 1.57	20.23 ± 1.84	22.34 ± 3.84	22.55 ± 1.25	21.25 ± 3.24	21.57 ± 1.74
		i	29.06 ± 1.53	27.21 ± 1.75	29.14 ± 1.90	28.47 ± 1.29	26.89 ± 2.00	27.84 ± 1.11
	Mandibular	g	4.97 ± 0.83	4.81 ± 1.01	5.10 ± 0.87	4.79 ± 0.84	4.72 ± 1.07	4.78 ± 0.88
		h	19.74 ± 1.18	17.44 ± 1.17	18.33 ± 3.55	18.86 ± 1.31	17.88 ± 2.01	18.57 ± 1.40
		i	26.41 ± 1.50	25.19 ± 2.04	25.84 ± 1.89	25.26 ± 1.19	25.17 ± 2.19	24.99 ± 1.39
Arch height		j	3.56 ± 1.03	4.53 ± 1.29	3.31 ± 1.13	3.19 ± 0.74	4.09 ± 0.97	3.82 ± 0.85
		k	7.87 ± 1.38	8.13 ± 1.31	7.45 ± 1.18	7.18 ± 0.81	8.09 ± 1.25	7.98 ± 0.88

also showed low values exceeding–1 S. D. in the mandibular D–D (c) and A–E (h), whereas females in the group of older children showed low values exceeding–1 S. D. in only the mandibular D–D (c) (Table 9–2).

Regarding normal primary occlusion in Japanese children[3], it has been reported that dental arch width tended to increase and dental arch length tended to decrease during the period in which children shifted from the younger group to the older group. Although children in Shanghai city showed similar results, the dental arch length tended to slightly increase in both males and females. Considering that the dental arch length tended to increase in females in Shijiazhuang city investigated in our study [1], we considered that there were slight differences in the changes in the measured values with aging between Japanese children and Chinese children, and we speculated that there were slight differences in the growth changes between Japanese children and Chinese children.

3. Interdental spaces

Interdental spaces play an important role in the arrangement and adjustment of the permanent teeth, and primate and developmental spaces together were most frequently observed in Japanese children and Chinese children [1,2,4].

We previously reported that the frequency of each type of interdental spaces in children in Shanghai city was between that in Japanese children and that in children in Shijiazhuang city [2]. Although the frequency that both primate and developmental spaces were observed was highest in both the maxilla and mandible in Chinese children, the frequency that only primate spaces were observed was slightly higher than that in Japanese children, and we left the determination of whether this finding was characteristic of Chinese children to future evaluation.

In addition in this investigation, the frequency that both primate and developmental spaces were observed was highest in both the maxilla and mandible in Chinese children (Table 10) ; however, because as we reported [1,2,4], the frequency that only primate spaces were observed was higher in both the maxilla and mandible than that in Japanese children, we speculated that the frequency that only primate spaces were observed was characteristic of Chinese children.

Table 10 : Inter dental spaces in different races

Inter dental Spaces			Japanese (n = 158) %	Chinese (Shijiazhuang city) (n = 55) %	Chinese (Shanghai city) (n = 72) %
Maxillary	Spaced type	Primate	2.5	20.0	16.7
		Primate + Developmental	91.8	69.0	76.4
		Developmental	2.5	3.7	1.4
	Closed type	close	3.2	7.3	5.5
Mandibular	Spaced type	Primate	7.6	9.1	12.5
		Primate + Developmental	70.9	61.8	65.3
		Developmental	12.0	10.9	9.7
	Closed type	close	9.5	18.2	12.5

4. Terminal planes and primary canine occlusal relationship

Terminal planes and primary canine occlusal relationship have been reported as factors to evaluate occlusion, and there have been reports that the incidence of Vertical type terminal plane was high [1,3].

Hatae [6] reported that the frequency of the Vertical type of terminal plane was highest, and that of the Mesial step type of terminal plane was second highest in Chinese children (Hong Kong and Taiwan), and similar results were obtained in our [4] investigation of Chinese children (Shijiazhuang city and Shanghai city) and in this investigation (Table 11). Chinese children also showed a markedly higher incidence of the combination of bilateral terminal planes (Mesial step–Mesial step) than Japanese children (Table 12), and we considered that the incidence of Mesial step type was characteristic of Chinese children.

Regarding primary canine occlusal relationship, the incidence of type Ⅰ was highest in Japanese children (Table 11), and similar results were obtained in this investigation of Chinese children [1,2,4], but the incidence of type Ⅰ in Chinese children was lower than that in Japanese children. However, because Chinese children showed a markedly higher incidence of type Ⅲ than Japanese children, we considered that type Ⅲ canine occlusal relationship was characteristic of Chinese children.

Table 11: Terminal plane and primary canine occlusion in different races

		Terminal plane			Primary canine occlusion		
		Vertical	Distal step	Mesial step	type I	type II	type III
		%	%	%	%	%	%
Japanese	Male	85.0	8.4	6.6	85.6	8.4	6.0
	(n = 83)	(141)	(14)	(11)	(142)	(14)	(10)
	Female	86.0	8.7	5.3	80.7	18.0	1.3
	(n = 75)	(129)	(13)	(8)	(121)	(27)	(2)
	Total	85.4	8.6	6.0	83.2	13.0	3.8
	(n = 158)	(270)	(27)	(19)	(263)	(41)	(12)
Chinese (Shijiazhuang city)	Male	36.1	5.6	58.3	59.7	11.1	29.2
	(n = 36)	(26)	(4)	(42)	(43)	(8)	(21)
	Female	52.6	7.9	39.5	68.4	18.4	13.2
	(n = 19)	(20)	(3)	(15)	(26)	(7)	(5)
	Total	41.8	6.4	51.8	62.7	13.6	23.7
	(n = 55)	(46)	(7)	(57)	(69)	(15)	(26)
Chinese (Shanghai city)	Male	67.6	5.4	27.0	44.6	12.2	43.2
	(n = 37)	(50)	(4)	(20)	(33)	(9)	(32)
	Female	58.6	11.4	30.0	48.6	14.3	37.1
	(n = 35)	(41)	(8)	(21)	(34)	(10)	(26)
	Total	63.2	8.3	28.5	46.5	13.2	40.3
	(n = 72)	(91)	(12)	(41)	(67)	(19)	(58)

Table 12: Relationship between terminal planes and primary canine occlusion in different races

Terminal plane		Primary canine occlusion	Male Japanese (n = 83) %	Male Chinese (Shijiazhuang city) (n = 36) %	Male Chinese (Shanghai city) (n = 37) %	Female Japanese (n = 75) %	Female Chinese (Shijiazhuang city) (n = 19) %	Female Chinese (Shanghai city) (n = 35) %	Total Japanese (n = 158) %	Total Chinese (Shijiazhuang city) (n = 55) %	Total Chinese (Shanghai city) (n = 72) %
Vertical	–	type I	77.8	25.0	33.8	73.3	36.8	35.7	75.6	29.1	34.7
Vertical	–	type II	3.0	6.9	10.8	12.0	13.2	7.1	7.3	9.1	9.1
Vertical	–	type III	4.2	4.2	23.0	0.7	2.6	15.7	2.5	3.6	19.4
Distal step	–	type I	2.4	2.8	4.0	2.6	0.0	1.5	2.5	1.8	2.8
Distal step	–	type II	5.4	2.8	1.3	6.0	5.3	7.1	5.7	3.6	4.2
Distal step	–	type III	0.6	0.0	0.0	0.0	2.6	5.7	0.3	0.9	2.8
Mesial step	–	type I	5.4	31.9	6.8	4.7	31.6	8.6	5.1	31.9	7.6
Mesial step	–	type II	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.9	0.0
Mesial step	–	type III	1.2	25.0	20.3	0.7	7.9	18.6	1.0	19.1	19.4

Table 13: Combination of bilateral terminal planes in different races

Types			Japanese (n = 158) %	Chinese (Shijiazhuang city) (n = 55) %	Chinese (Shanghai city) (n = 72) %
Vertical	–	Vertical	77.8	32.8	51.4
Vertical	–	Distal step	9.5	3.6	12.5
Vertical	–	Mesial step	5.7	14.6	11.1
Distal step	–	Distal step	3.8	3.6	1.4
Mesial step	–	Mesial step	3.2	43.6	22.2
Mesial step	–	Distal step	0.0	1.8	1.4

In regard to the combinations of terminal plane types and primary canine occlusal relationships, although the incidence of Vertical–type I was highest in both Japanese children and children in

Shanghai city, the incidence of Vertical–type Ⅰ in children in Shanghai city and that in Shijiazhuang city were lower than that in Japanese children (Table 13). However, children in Shanghai city showed a higher incidence of Vertical–type Ⅲ and Mesial–type Ⅲ than Japanese children, and children in Shijiazhuang city showed a higher incidence of Mesial–type Ⅲ than Japanese children, we considered that Chinese children showed a higher incidence of Mesial type terminal plane, and types Ⅰ and Ⅲ primary canine occlusal relationships than Japanese children, and we speculated that the incidence of Mesial step type terminal plane and that of type Ⅲ primary canine occlusal relationship in particular were characteristic of Chinese children.

Conclusion

To obtain the definite standard values for various items regarding the growth and development of Chinese children, we performed dental examinations on children in the kindergarten attached to Shanghai Teachers' University in Shanghai city. As study materials, dental casts obtained between 1996 and 1999 from 72 Chinese children aged 3 to 6 years with normal primary occlusion were used to evaluate the mesio–distal crown diameters of the primary teeth, the sizes of the primary dental arch, and the standard values and frequency distributions of primary occlusion based on the Japanese Society of Pediatric Dentistry (J. S. P. D.) standard of normal primary occlusion.

The following conclusions were drawn.

1. As a result of the measurement of the mean values of the mesio–distal crown diameters of the deciduous teeth, and the sizes of the primary dental arch, males showed higher values than females.
2. In regard to the interdental spaces both in the maxilla and mandible, primate and developmental spaces together were most frequently observed.
3. In regard to the occlusal relationship, the incidence of terminal planes was higher in the order of Vertical type > Mesial step type > Distal step type, and the incidence of primary canine occlusal relationships was higher in the order of type Ⅰ > type Ⅲ > type Ⅱ.
4. The items that were thought to be characteristic of Chinese children were the frequency that only primate spaces were observed, and the incidence of the Mesial step type terminal plane and type Ⅲ primary canine occlusal relationship.

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抄録：中国上海市小児における乳歯列形態の検討—正常咬合児72例の模型から—

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著者らは中国人小児の成長・発達に関する諸項目の基準値を明確にすることを目的に，上海師範大学付属幼稚園児の歯科検診を1996年より実施している．そこで1996年から1999年までに得られた正常咬合と考えられた3歳から6歳の小児72例の乳歯列模型を研究資料とし，乳歯歯冠および乳歯列弓の大きさ，咬合状態の検討を行った．

1．歯冠近遠心幅径，歯列弓の大きさは，男児の方が大きい値を示した．
2．歯間空隙状態は，上下顎ともに霊長空隙と発育空隙が共存するものが最も高率に認められた．
3．咬合関係はターミナルプレーンが垂直型＞近心型＞遠心型の順に高く，乳犬歯咬合関係ではⅠ型＞Ⅲ型＞Ⅱ型の順に高い発現率を示した．
4．中国人小児に特徴的に発現すると考えられたものは，霊長空隙のみの発現とターミナルプレーンの近心型，乳犬歯咬合状態のⅢ型であった．