Short Communication

PHYSICAL PARAMETERS IN JAPANESE NEWBORNS

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Summary A total of 19 physical parameters of the head, face, chest, and the fingers were examined in Japanese 50 male and 50 female newborns, measured 8 to 64 hr after birth. Exceptional values were excluded referring to the estimated mean and standard deviations. Normal values are presented as mean $\pm$ 2 S.D. for each sex. As compared with Caucasian newborns, the Japanese newborns showed longer inner canthal and shorter outer canthal distances, shorter ear lengths, and longer palm and middle finger lengths.

Key Words physical parameters, anthropometric measurements, Japanese newborns

INTRODUCTION

We reported previously on 19 physical parameters of the head, face, and the hand in Japanese 1 month to 15 year-old children (Igarashi and Kajii, 1988). The study, however, did not include newborn infants. In order to fill the gap, measurements in newborns were carried out. The present report will deal with the results of the study, and compare the results with those of Caucasian newborns.

MATERIALS AND METHODS

The subjects of the present study were 50 male and another 50 female, full-term, normal, newborn Japanese infants, born in the Perinatal Care Center of our hospital during a period from June, 1991 to January, 1992. Their gestational age ranged from 261 to 290 days (mean 276 days). Of the 100 newborns studied, 89 were vaginally delivered and the remaining 11 babies were delivered by Caesarean section. The birth weights of the male babies ranged from 2,525 g to 3,775 g (mean 3,118 g), and those of the female babies were from 2,525 g to 3,788 g (mean 3,143

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g). Infants with a major anomaly or with three or more minor anomalies were excluded from the study.

Measurements of 19 physical parameters (Fig. 1): The 19 physical parameters measured were: 1, head circumference; 2, head length; 3, head breadth; 4, face breadth; 5, inner canthal distance; 6, outer canthal distance; 7, nose length; 8, nose breadth; 9, philtrum length; 10, mouth breadth; 11, ear length; 12, ear width; 13, ear height; 14, ear depth; 15, palm length; 16, middle finger length; 17, fifth finger length; 18, hallux width; 19, hallux length.

Fig. 1. Physical parameters of the head, face, hands, and feet. 2, head length; 3, head breadth; 4, face breadth; 5, inner canthal distance; 6, outer canthal distance; 7, nose length; 8, nose breadth; 9, philtrum length; 10, mouth breadth; 11, ear length; 12, ear width; 13, ear height; 14, ear depth; 15, palm length; 16, middle finger length; 17, fifth finger length; 18, hallux width; 19, hallux length.

13, chest circumference; 14, internipple distance; 15, palm length; 16, middle finger length; 17, fifth finger length; 18, hallux width; and 19, hallux length. Some parameters recorded in the previous study of older infants and children (Igarashi and Kajii, 1988) were excluded in the present study, in view of the difficulty in measurements in the newborns. Those excluded were: 1. total head height, 2. face height, 3. interpupillary distance, 4. upper lip thickness, and 5. lower lip thickness. Instead, the following parameters were included in the present study: 1. ear width, 2. chest circumference, 3. internipple distance, 4. hallux width, and 5. hallux length. The ear length measured was the maximum distance from the superior aspect to the inferior aspect of the external ears (Fig. 1, No. 11), rather than the vertical distance as measured in the previous study of older infants and children (Igarashi and Kajii, 1988). Measurements were performed in most instances 8 to 40 hr after birth, with exceptions of weekend delivery, in which they were delayed up to 64 hr.

Table 1. Physical parameters of the head, face, chest, hands and feet in Japanese newborns: Mean $\pm$ 2 S.D. (in cm).

Parameter	Male newborns			Female newborns		
	Mean	$\pm$ 2 S.D.	Observed range	Mean	$\pm$ 2 S.D.	Observed range
Head						
Circumference	33.9	32.0-35.8	(32.5-35.2)	33.2	31.0-35.4	(29.0-35.5)
Length	11.2	10.5-12.0	(10.4-12.2)	10.9	10.2-11.7	(10.1-11.6)
Breadth	9.5	8.7-10.3	(8.7-10.5)	9.4	8.6-10.2	(8.4-11.0)
Face						
Face breadth	7.1	6.6-7.6	(6.4-7.6)	7.0 ^a	6.5-7.5	(6.3-7.6)
Inner canthal distance	2.4	2.1-2.7	(2.1-2.8)	2.4	2.1-2.7	(2.1-2.7)
Outer canthal distance	5.6	5.0-6.1	(5.0-6.3)	5.5	5.1-5.9	(5.1-6.0)
Nose length	2.2	1.9-2.4	(1.9-2.4)	2.2	1.9-2.4	(1.9-2.6)
Nose breadth	2.3	2.0-2.5	(1.9-2.7)	2.2 ^a	2.0-2.4	(2.0-2.4)
Philtrum length	0.9	0.6-1.2	(0.6-1.1)	0.9	0.6-1.1	(0.7-1.1)
Mouth breadth	2.7	2.2-3.1	(2.2-3.1)	2.6	2.3-2.9	(2.3-2.9)
Ear length	3.6	3.1-4.1	(3.0-4.0)	3.5	3.0-4.0	(2.8-4.0)
Ear width	2.7	2.3-3.1	(2.3-3.1)	2.6	2.2-3.0	(2.2-3.0)
Chest						
Circumference	32.0	29.2-34.9	(29.0-35.2)	32.3	29.4-35.2	(29.0-35.5)
Internipple distance	7.7	6.9-8.6	(6.7-8.6)	7.7	6.6-8.7	(6.5-8.8)
Hands						
Palm length	3.7	3.3-4.1	(3.2-4.1)	3.7 ^a	3.3-4.0	(3.4-4.0)
Middle finger length	2.8	2.4-3.1	(2.3-3.1)	2.8	2.5-3.0	(2.5-3.0)
Fifth finger length	2.2	1.9-2.5	(1.8-2.5)	2.2	1.9-2.5	(1.8-2.7)
Feet						
Hallux width	1.0	0.9-1.2	(0.9-1.1)	1.0	0.8-1.2	(0.8-1.3)
Hallux length	1.2	1.0-1.4	(1.1-1.5)	1.2	1.0-1.4	(0.9-1.4)

^a One measurement each was disregarded as an extreme value.

The head circumference, chest circumference, and internipple distance were measured with a measuring tape, the head length, head breadth, and face breadth were estimated with a spreading caliper (Atom Co., Japan), and the measurements of the facial and hand parameters were performed with a sliding caliper (Emi Co., Japan).

The provisional mean, standard deviations (S.D.), and the minimum and maximum values were calculated for each of the 19 parameters in both male and female infants. Of these, both right and left sides were measured of the ear length, ear width, palm length, middle finger length, fifth finger length, hallux width, and hallux length. In view of the absence of appreciable differences, only the values on the left side are listed of ear length and width, and the right side of palm length, middle finger length, fifth finger length, hallux length, and hallux width. Exceptional, outlying values were rejected referring to the expected extreme values for a normal distribution of the estimated mean and standard deviations. The expected extreme values were calculated at the 1% level, referring to Smirnov's constant. Of the 1,900 measurements, 3 (0.15%) were thus disregarded. The mean values and the ± 2 S.D. ranges were calculated for each category (Table 1).

RESULTS AND DISCUSSION

The results of measurements of 19 physical parameters are given in Table 1. Most of the parameters of the head and face were larger in the male than in the female newborns studied, but the differences were not statically significant. The chest circumference in the female newborns tended to be larger than that in the male newborns, but the difference was again not statically significant. No differences were noted of the parameters of the hands and feet.

The head circumference, head length, head breadth, face breadth, and the chest circumference were compared between the vaginally delivered babies and those delivered by Caesarean section (Table 2). No statistically significant difference was noted.

The values obtained in Japanese newborns in the present study were compared

Table 2. Mode of delivery.

Parameter	Vaginal delivery (n=89)	Caesarean section (n=11)	p value
	Mean (S.D.)	Mean (S.D.)	
Head circumference	33.5 (1.06)	33.9 (0.72)	p=0.20
Head length	11.1 (0.40)	11.3 (0.38)	p=0.13
Head breadth	9.45 (0.40)	9.52 (0.42)	p=0.62
Face breadth	7.0 (0.27)	7.1 (0.27)	p=0.58
Chest circumference	32.2 (1.43)	32.5 (1.56)	p=0.42

with those in Caucasian newborns, the latter collected from the literature (Table 3). Of the 19 parameters obtained in the present study, 15 were compared with Caucasian newborns. Measurements of both sexes were pooled in the comparison, in view of the fact that in most Caucasian studies the values for both sexes were pooled. Japanese newborns showed a larger inner canthal distance, palm length, and middle finger length than in Caucasian newborns. On the other hand, the outer canthal distance and ear length were smaller in Japanese than in Caucasian newborns.

As mentioned earlier, the present study of Japanese newborns is a continuation of our previous study of Japanese children aged 1 month to 15 years (Igarashi and Kajii, 1988). In the previous study, the infants up to 12 months were grouped to those of 1-3 months, 4-6 months, and 7-12 months, each comprising of 50 male and 50 female infants. The present data of newborns would supplement and reinforce those in the previous study. The present study concerned exclusively with

Table 3. Comparison of 15 physical parameters in Japanese and Caucasian newborns.

Parameter	Japanese		Caucasian	Reference
	Mean (S.D.)		Mean (S.D.)	
Head				
Circumference	33.5 (1.07)		33.8	Lubchenco <i>et al.</i> , 1966
Length	11.1 (0.40)		11.3 (0.45)	Merlob <i>et al.</i> , 1984
Breadth	9.5 (0.40)		9.4 (0.5)	Merlob <i>et al.</i> , 1984
Face				
Inner canthal distance	2.4 (0.15)	>	2.2 (0.2)	Omotade, 1990
Outer canthal distance	5.5 (0.23)	<	6.3 (0.4)	Omotade, 1990
Nose breadth	2.3 (0.13)		2.1 (0.05)	Goodman and Gorlin, 1977
Philtrum length	0.9 (0.13)		1.04	Merlob <i>et al.</i> , 1984
Mouth breadth	2.6 (0.19)		2.7 (0.2)	Merlob <i>et al.</i> , 1984
Ear length	3.5 (0.24)	<	3.9 (0.3)	Merlob <i>et al.</i> , 1984
Ear width	2.7 (0.21)		2.7	Goodman and Gorlin, 1977
Chest				
Circumference	32.2 (1.44)		31.5 (1.5)	Merlob <i>et al.</i> , 1984
Internipple distance	7.7 (0.48)		7.9 (0.4)	Sivan <i>et al.</i> , 1983a
Hands				
Palm length	3.7 (0.17)	>	3.4	Sivan <i>et al.</i> , 1983b
Middle finger length	2.8 (0.15)	>	2.6 (0.15)	Merlob <i>et al.</i> , 1984
Feet				
Hallux width	1.2 (0.10)		1.0	Wilhelm, 1986

full-term newborns. We wish to extend the study in the future to include premature babies.

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