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Studies on Physical and Mental Growth of Prematurely Born Children

Series I. Physical Development, Part 6
Some Considerations on Somatotype for Prematurely Born Children at Successive Ages from Primary School to Junior High School

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The present paper described the results of somatotype for the prematurely born children at successive ages from primary school to junior high school in our follow-up study. The prematurely born children were consistently more inferior in somatotypy when compared with the matched control group of maturely born children.

The previous papers[12)9)11)13)3)1)10)2)7)8)4)] of our follow-up study on physical and mental growth of prematurely born children throughout 9 years from the lst grade of primary school to the 3 rd year of junior high school (at ages from 6 to 14 years) concluded that the prematurely born children had not reduced their handicaps in physical development throughout 9 years when compared with the matched control group of maturely born children. Especially TOMOYORI[13)] pointed out that the prematurely born children at the 3 rd year of junior high school were inferior in morphological development of physique to the mature controls. (By the way, the lst, 2 nd, and 3 rd years of junior high school in Japan respectively correspond to the 7 th, 8 th, and 9th grades of junior high school in Europe and America.)

In the present paper, the authors attempted to synthetically assess the somatotype of prematurely born children at successive ages from primary school to junior high school.

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MATERIALS and METHODS of SOMATOTYPY

1) *Materials*

Among 8213 live births registered in Nagasaki City for a year, from April 2, 1948 to April 1, 1949, 150 prematurely born children with a matched control group of 302 maturely born children were sampled for the follow-up study when they were in the lst grade of primary school. The selection of sample was made on the basis of sex, date of birth, residence and school class.

The follow-up study started in 1955 and finished in 1963. Owing to unavoidable losses from removal, 22 prematurely and 60 maturely born children have been out of the study when the survey children were in the 3rd year of junior high school. The number of survey children at each school age for the present paper is shown in Table 2 in which the data were described.

2) *Methods of somatotypy*

In our follow-up study, the prematurely born children were inferior in substantial development of physique, assessed by weight-height ratio or WETZEL's developmental level, when compared with the mature controls. And then, the deficiency in height growth for prematurely born children was considered to be caused by their deficiency in leg length growth.

Therefore, the somatotypes for these survey children by sex and by each school age were classified according to the developmental grade in weight-height ratio and in leg length-height ratio, as shown in Table 1.

Table 1 Methods of somatotypy

Leg length-Height Ratio	Weight-Height Ratio: >(M+S.D.) A	(M±S.D.) B	<(M−S.D.) C
>(M+S.D.) A′	AA′	BA′	CA′
(M±S.D.) B′	AB′	BB′	CB′
<(M−S.D.) C′	AC′	BC′	CC′

Note : (1) M and S.D. respectively are mean value and standard deviation for total boys or girls at each school age.

(2) the following four somatotypes are classified :

superior type : AA′, BA′, AB′
inferior type : BC′, CB′, CC′
moderate type : BB′
unbalanced type : CA′, AC′

especially AA′ : plump type with longer leg length relative to body length

CC′ : slender type with shorter leg length relative to body length

The results at each school age are shown in table 2. And then, finally the synthetic assessment on the somatotype of survey children at

successive ages from primary school to junior high school was conducted by the following methods:

1. superior type : the children who were in superior type for 5 years or more.
2. inferior type : the children who were in inferior type for 5 years or more.
3. miscellaneous type : the remaining children except the above-mentioned two cases.

When the children were measured only for 7 years through absence, the following procedure was used :

1. superior type : superior type for 4 years or more.
2. inferior type : inferior type for 4 years or more.
3. miscellaneous type : the remaining cases.

RESULTS and DISCUSSION

In our present study, the results comparing the somatotype of prematurely born children with that of mature controls were shown in Table 2.

Table 2 Somatotypy for the survey children at successive ages from the 2nd grade of primary school to the 3rd year of junior high school (%)

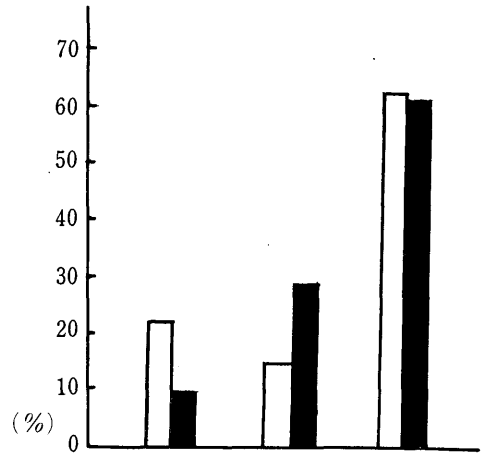
	somatotypy	primary school					junior high school		
		2nd grade (7 yrs of age)	3rd grade (8 yrs of age)	4th grade (9 yrs of age)	5th grade (10yrs of age)	6th grade (11yrs of age)	1st year (12yrs of age)	2nd year (13yrs of age)	3rd year (14yrs of age)
premature group	superior type	15(10.7)	20(15.2)	20(15.5)	17(12.4)	15(11.4)	15(11.6)	19(14.8)	20(15.6)
	moderate type	74(52.9)	71(53.8)	68(52.7)	69(50.4)	70(53.0)	64(49.6)	61(47.7)	61(47.7)
	unbalanced type	5(3.6)	4(3.0)	4(3.1)	6(4.4)	7(5.3)	11(8.5)	7(5.5)	5(3.9)
	inferior type	46(32.8)	37(28.0)	37(28.7)	45(32.8)	40(30.3)	39(30.3)	41(32.0)	42(32.8)
	total	140(100.0)	132(100.0)	129(100.0)	137(100.0)	132(100.0)	129(100.0)	128(100.0)	128(100.0)
mature group	superior type	81(27.6)	64(25.1)	83(31.7)	62(23.9)	75(29.4)	76(30.6)	74(30.3)	76(31.4)
	moderate type	153(52.0)	146(57.2)	132(50.4)	141(54.2)	132(51.8)	119(48.0)	108(44.3)	104(43.0)
	unbalanced type	5(1.7)	5(2.0)	4(1.5)	11(4.2)	7(2.7)	15(6.1)	19(7.8)	17(7.0)
	inferior type	55(18.7)	40(15.7)	43(16.4)	46(17.7)	41(16.1)	38(15.3)	43(17.6)	45(18.6)
	total	294(100.0)	255(100.0)	262(100.0)	260(100.0)	255(100.0)	248(100.0)	244(100.0)	242(100.0)
x^2-test, df = 2		$x^2=20.44$ $P<0.001$	$x^2=10.71$ $P<0.005$	$x^2=15.19$ $P<0.001$	$x^2=13.86$ $P<0.001$	$x^2=22.18$ $P<0.001$	$x^2=22.07$ $P<0.001$	$x^2=15.79$ $P<0.001$	$x^2=15.25$ $P<0.001$

Note : (1) the measurement of leg length was carried out for 8 years from the 2nd grade of primary school to the 3rd year of junior high school.
(2) the children in moderate type and in unbalanced type were grouped together for chi-square test.

The prematurely born children were consistently over-represented among the inferior somatotype and under-represented among the superior somatotype when the results of somatotypy for successive 8 years from the 2 nd grade of primary school to the 3rd year of junior high school were compared between the both premature and mature groups.

And then, the synthetic assessment on the somatotype of survey children at successive ages from primary school to junior high school, shown in Figure 1, also confirmed the handicap of prematurely born children in somatotypy.

Fig. 1 Synthetic assessment on somatotypy



Note : (1) open bar ····· mature group (242 children)
shaded bar ····· premature group (128 children)
(2) comparing both groups by chi-square test, df=2, $x^2 = 13.12$, $p < 0.005$

CAPPER[5] reported the following conclusion with regard to the physical development of the immature infants : the majority of the immature infants belong to a definite type, namely, the asthenic type, it is likely that their backwardness in gaining in height and in weight, since it has not been overcome at puberty, is not transitory but will remain as a permanent condition of physical subnormality. SCHWINN[14] also reported the somewhat similar results.

In the EDINBURGH Study, DRILLIEN[6] described the following proportion of prematurely born children of markedly small stature at 5 years : of children who were 4½ lb. or less at birth, one-third were markedly underweight (i. e. measuring less than the 5 th percentile for mature controls), one-fifth were markedly underheight, and one-sixth both underweight and underheight.

The results of our present paper seemed to support these findings.

SUMMARY

The present paper, describing the somatotype of prematurely born children in our follow-up study, concluded that the prematurely born children at successive ages from primary school to junior high school (at ages from 7 to 14 years) had not reduced their handicaps in somatotypy when compared with the mature controls.

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