

# Association between birth weight and the amount of annual changes in physical fitness in preschool children

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**[Abstract]** Birth weight affects endurance capacity, muscle strength, and jump performance of school age children. However, it is unknown in the case of preschool children. Furthermore, it is also unclear whether birth weight affects the annual changes of physical fitness. This study aimed to clarify this subject by examining longitudinal data of over 2 years in preschool children. Physical fitness tests (five events: sit-and-reach, grip strength [right and left hands], standing long jump, 25-m run, and tennis ball throw) were conducted on 312 preschoolers (156 boys and girls each) aged 4 to 6 years, once a year for 2 years. Partial correlation analyses were conducted to examine the relationship between birth weight and physical fitness scores. Birth weight was significant but weakly positively correlated with height, weight, and sit-and-reach scores in the first and second measurements and the performance of standing long jump in the first measurement and grip strength in the second measurement. However, the annual changes in all fitness test items were not related to birth weight. The present study indicates that birth weight is associated with sit-and-reach and standing long jump scores and grip strength, it does not affect annual changes in physical fitness.

## Introduction

Birth weight is an independent determinant of children's physical fitness. For example, birth weight is positively correlated with grip strength and negatively correlated with running ability in children aged 7-10 years, even after adjusting for age, height, BMI, and body fat percentage<sup>1)</sup>. Birth weight also positively affects endurance (20-m shuttle run test) at age 12<sup>2)</sup>. Furthermore, there is

an indication that birth weight is also associated with grip strength at age 9 and flexibility at age 6-7<sup>3,4)</sup>. These studies are based on the Developmental Origins of Health and Disease (DOHaD)<sup>5)</sup>, stating that environmental factors during pregnancy and early postnatal life affect disease risk in later life, but they also indicate that birth weight may be important for athletic performance during childhood and beyond. The average birth weight in Japan has decreased by approximately 250g since 1960. In 2019, the proportion of low birth weight babies (< 2,500g) was 9.4%. This value is higher than 6.5% in Organisation for Economic Co-operation and Development (OECD) member countries, which indicates that Japan, Greece, Portugal, and Colombia have the highest proportion of low birth weight preschool children

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among OECD member countries<sup>6)</sup>. Another OECD report showed that Papua New Guinea, South Korea, Malaysia, Japan, and Brunei are the only countries where the percentage of preschool children with low birth weight has increased since 2000 in Asia-Pacific<sup>7)</sup>. Therefore, the current decline of birth weight in Japan is distinctive compared to other countries. Taking this into account with previous findings on the association between birth weight and physical fitness in school children, there is concern that the physical fitness of Japanese children will continue to decline or remain at a low level in the future.

Although the findings mentioned above were reported among school-aged children, the associations may begin at younger ages. In addition, even though early childhood is a period of significant development, previous studies were based on cross-sectional observations and provided limited information on how birth weight affects the magnitude of longitudinal changes in physical fitness during this life stage. Clarifying this subject will help us to understand the influence of birth weight on the profiles of physical development in preschool children.

The present study aimed to elucidate how birth weight is associated with the amount of change in physical fitness of preschool children by examining comprehensive data obtained from longitudinal observations for two years.

## Materials & Methods

### 1. Participants

This study performed a secondary analysis of the data obtained by the “Active Child Program” conducted in City A with a population of 400,000. Data were provided by the Nursery Center Division of City A in an anonymized form with an assigned ID. Between 2014 and 2018, City A invited the parents of all preschool children attending 10 public preschools in the city to participate in the “Active Child Program”, and obtained consent from the children and their guardians to participate in the study. The participants of this study were 365 children (179 boys and 186 girls) aged 4-

6 years. Physical and fitness measurements were conducted on all participants. In addition, another measurement day was designated for participants who were absent on the measurement day and those who could not to adhere to the prescribed procedures during the physical fitness tests. As a result, 312 children (156 boys and 156 girls) aged 4 to 6 years were included in the analysis.

### 2. Materials

The birth weight was obtained from the guardians of the Maternal and Child Health Handbook. Morphological measurements (height, weight, and BMI-SDS) and fitness tests were conducted once a year for 2 years. Fitness tests consisted of five items (sit-and-reach, grip strength, standing long jump, 25-m run, and tennis ball throw). These tests were administered in the yard or indoors at each school. Before the measurement of each item, the measurer demonstrated to the subject. The measurers also explained the measurement methods to subject with the nursery school teachers. The measurers were trained in advance on the measurement methods. In this study, the amount of annual change in the measured variables was calculated as the difference between the first- and second-year measurements.

#### 1) Sit-and-reach

Sit-and-reach was determined using a dedicated measuring instrument (“T-283” TOEI LIGHT Inc., Japan). The participants assumed a long-sitting posture and then bent forward slowly without bending the knees while sliding the measuring instruments straight forward as far as possible. The sliding distance of the instrument was measured to the nearest 0.1cm and recorded as a sit-and-reach score. The test trials were performed twice and the better score was recorded.

#### 2) Grip strength

Grip strength was measured using a dynamometer designed for pediatric patients (“13B3X 00118” Matsumiya Medical Precision Machinery Co., Japan). The scores were measured to the nearest of 0.1kg. The measurements were per-

formed twice, alternately on the right and left hands, and the better one on each side was recorded.

### 3) Standing long jump

Participants stepped on both feet simultaneously and jumped forward as far as possible. The shortest distance between the landing and crossing points in centimeters was measured to the nearest 0.1 cm. The participants performed the jump task twice, and the better score was recorded.

### 4) 25-m run

The time required to run the distance of a 25-m was measured by using a stopwatch ("TD-392" TANITA Co., Japan). The duration of the 25-m run test was measured to the nearest 0.1 seconds.

### 5) Tennis ball throw

Participants were asked to throw a tennis ball with a diameter of 7 cm and a weight of 58 g as far as possible. The throwing distance was recorded at 1 cm. Participants performed the throwing task twice after the demonstration, and the better score was adopted.

## 3. Statistical analysis

The normality of each data set was assessed using the Shapiro-Wilk test, and descriptive data are presented as mean  $\pm$  standard deviation (SD) and median. The differences in the analyzed variables between boys and girls were examined using an unpaired t-test and Mann-Whitney U test. The differences between the first and second year were also examined using the paired t-test and Wilcoxon signed rank test. Partial correlation analysis was conducted to examine the relationship between birth weight and the results of fitness tests for each measurement year while controlling for month age and sex. In case of the data did not conform to a normal distribution, a Box-Cox transformation was applied before analysis. The magnitude of the observed correlation was evaluated based on Cohen's (1998) conventions, which categorize effect sizes as follows: small (0.1 to  $<0.3$ ), moderate (0.3 to  $<0.5$ ), and large ( $\geq 0.5$ ). As this study used secondary data from City A, the effect size was calculated post hoc using  $G^*$

Power, yielding an effect size of 0.16. Statistical analyses were conducted using SPSS Statistics ver.27 (IBM Corp., Armonk NY, USA). The statistical significance level was set at 5%.

## Results

### 1. Annual changes in morphological variables and scores of fitness tests

Both boys and girls showed a significant increase in height and weight between the first and second measurements. There were no significant differences between boys and girls in terms of birth weight and months age, height, weight, or BMI-SDS, which were determined in the first and second measurements (Table 1).

The results of the physical fitness test showed that the second measurement was significantly better than the first measurement for grip strength, standing long jump, 25-m run, and tennis ball throw. There was no difference between the first and second measurements of sit-and-reach. The sit-and-reach test scores in both year measurements were significantly higher in girls than in boys. On the other hand, boys showed significantly better performance than girls in the 25-m run in the first-year measurement, grip strength in the second-year measurement, and standing long jump and tennis ball throw scores in both years. Moreover, the amount of annual change in grip strength (left) and tennis ball throws was significantly higher in boys than in girls (Table 2).

### 2. Relationship between birth weight and physical measurements and fitness tests

Birth weight was weak positively correlated with sit-and-reach scores on the first and second measurements ( $r=0.18$  and  $r=0.16$ , Table 3). There were also weak positive correlations between birth weight and standing long jump in the first measurement ( $r=0.11$ ), and between birth weight and grip strength in the second measurement ( $r=0.12$ ). However, the birth weight did not significantly correlate with the annual changes in any of the measured variables.

In the boys, a weak positive correlation was ob-

Table 1 Physical characteristics of the participants

	All (n = 312)			Boys (n = 156)			Girls (n = 156)			
	Mean ± SD	Median [IQR]	<i>p value</i> *1	Mean ± SD	Median [IQR]	Mean rank	Mean ± SD	Median [IQR]	Mean rank	<i>p value</i> *2
Birth weight (kg)	2.980 [2.707~3.250]		-		3.022 [2.713~3.259]	159.95		2.959 [2.701~3.220]	153.05	0.499 †
Month age (Months)			<0.001 †							
First year	62 [59~65]			62 [58~66]		160.70		62 [59~64]	152.30	0.410 †
Second year	73 [69~75]			73 [69~75]		156.38		72 [69~76]	156.62	0.981 †
Δ	12 [8~12]			12 [6~12]		149.26		12 [8~12]	163.74	0.133 †
Height (cm)			<0.001							
First year	107.6 ± 4.8			108.0 ± 4.4			107.2 ± 5.3			0.086
Second year	113.4 ± 4.9			113.9 ± 4.3			113.0 ± 5.4			0.089
Δ	6.0 [4.5~6.9]			6.0 [4.4~7.0]		153.45		6.1 [4.6~6.9]	159.55	0.550 †
Weight (kg)			<0.001 †							
First year	17.4 [16.0~18.9]			17.6 [16.4~19.0]		165.04		17.2 [15.8~18.8]	147.96	0.094 †
Second year	19.3 [17.5~21.0]			19.6 [18.0~21.4]		164.20		19.1 [17.2~20.7]	148.80	0.132 †
Δ	1.9 [1.2~2.4]			1.8 [1.2~2.5]		153.88		1.9 [1.3~2.4]	159.12	0.608 †
BMI SDS			<0.001 †							
First year	-0.1 [-0.7~0.4]			-0.1 [-0.7~0.4]		155.38		-0.1 [-0.7~0.4]	157.62	0.827 †
Second year	-0.2 [-0.9~0.3]			-0.2 [-0.9~0.2]		153.84		-0.2 [-0.9~0.4]	159.16	0.602 †
Δ	-0.1 [-0.4~0.1]			-0.1 [-0.4~0.1]		153.63		-0.1 [-0.4~0.1]	159.38	0.572 †

*p value*\*1: Paired t-test ( † : Wilcoxon signed-rank sum test) comparing the first and the second year

*p value*\*2: Student's unpaired t-test ( † : Mann-Whitney's U test) comparing boys and girls

IQR: interquartile range

Δ: the difference between the first and second measurements

Table 2 Descriptive data on the scores of fitness test

	All			Boys			Girls			<i>p</i> value*2		
	n	Mean ± SD	Median [IQR]	<i>p</i> value*1	n	Mean ± SD	Median [IQR]	Mean rank	n		Mean ± SD	Median [IQR]
Sit-and-reach (cm)				0.138								
First year	307	28.5 ± 5.8			154	27.8 ± 5.5			153	29.1 ± 6.1		
Second year	307	29.0 ± 6.1			152	28.2 ± 6.0			155	29.9 ± 6.1		
Δ	304		0.4 [-3.3 ~ 3.5]	<0.001	151		0.8 [-3.8 ~ 3.5]	151.96	153		0.0 [-3.0 ~ 3.6]	153.04
Grip strength (kg)												
First year	309	5.0 ± 1.7			156	5.1 ± 1.8			153	4.8 ± 1.7		
Second year	312	6.4 ± 1.8			156	6.6 ± 1.8			156	6.1 ± 1.9		
Δ	308		1.3 [0.5 ~ 2.3]	<0.001 †	155		1.3 [0.8 ~ 2.3]	160.74	153		1.3 [0.5 ~ 2.0]	152.26
Grip strength (Right) (kg)												
First year	309		5.0 [4.0 ~ 6.5]	<0.001 †	156		5.0 [4.0 ~ 6.4]	160.96	153		5.0 [3.5 ~ 6.5]	148.92
Second year	312		6.5 [5.8 ~ 8.0]		156		7.0 [5.6 ~ 8.0]	163.64	156		6.5 [5.0 ~ 7.5]	149.36
Δ	308		1.5 [0.5 ~ 2.5]	<0.001 †	155		1.5 [0.5 ~ 2.5]	157.18	153		1.5 [0.5 ~ 2.5]	151.78
Grip strength (Left) (kg)												
First year	307		4.5 [3.5 ~ 6.0]	<0.001 †	154		5.0 [3.5 ~ 6.0]	160.95	153		4.5 [3.5 ~ 6.0]	147.01
Second year	311		6.0 [5.0 ~ 7.0]		155		6.5 [5.0 ~ 7.5]	170.30	156		5.8 [4.5 ~ 7.0]	141.79
Δ	306		0.5 [1.0 ~ 2.5]	<0.001 †	153		1.5 [0.5 ~ 2.5]	159.79	153		1.0 [0.0 ~ 2.0]	147.21
Standing long jump (cm)												
First year	307		83.8 [72.5 ~ 93.2]	<0.001 †	153		88.0 [76.0 ~ 98.3]	179.57	154		78.3 [68.3 ~ 87.2]	128.59
Second year	312	97.1 ± 17.4			156	100.6 ± 19.5			156	93.5 ± 14.3		
Δ	307		14.1 [4.5 ~ 23.7]	<0.001 †	153		12.5 [3.4 ~ 22.8]		154		14.7 [5.2 ~ 25.0]	
25-m run (seconds)												
First year	158		8.2 [7.0 ~ 8.9]		79		7.9 [6.8 ~ 8.7]	141.14	79		8.4 [7.1 ~ 9.0]	165.69
Second year	150		7.5 [6.3 ~ 8.5]		77		7.3 [6.3 ~ 8.3]	144.01	73		7.6 [6.5 ~ 8.6]	162.05
Δ	149		-0.5 [-0.9 ~ -0.1]		76		-0.4 [-0.9 ~ -0.1]	161.22	73		-0.5 [-1.0 ~ -0.1]	151.78
Tennis ball throw (m)												
First year	309		4.3 [3.4 ~ 5.4]	<0.001 †	153		5.2 [3.9 ~ 6.2]	187.10	156		3.9 [3.2 ~ 4.7]	123.52
Second year	308		5.6 [4.5 ~ 7.1]		153		6.6 [5.1 ~ 8.2]	191.69	155		5.0 [4.1 ~ 5.9]	117.79
Δ	305		1.2 [0.4 ~ 2.3]		150		1.6 [0.4 ~ 3.1]	167.06	155		1.1 [0.4 ~ 1.8]	139.40

*p* value\*1: Paired t-test ( † : Wilcoxon signed-rank sum test) comparing the first and the second year

*p* value\*2: Student's unpaired t-test ( † : Mann-Whitney's U test) comparing boys and girls

IQR: interquartile range

Δ: the difference between the first and second measurements

**Table 3 Correlation coefficients between birth weight and the results of fitness tests**

Variables	First year			Second year			Amount of change <sup>a</sup>		
	Birth weight	Height	Weight	Birth weight	Height	Weight	Birth weight	Height	Weight
Birth weight	-			-			-		
Height	0.18**	-		0.18**	-		0.03	-	
Weight	0.28**	0.69**	-	0.24**	0.68**	-	0.05	0.35**	-
Sit-and-reach	0.18**	0.18**	0.19**	0.16**	0.07	0.10	-0.02	0.02	-0.07
Grip strength	0.10	0.39**	0.39**	0.12*	0.43**	0.47**	0.05	0.04	0.09
Grip strength (right)	0.10	0.40**	0.39**	0.11	0.44**	0.46**	0.04	0.07	0.14*
Grip strength (left)	0.11	0.36**	0.37**	0.13*	0.39**	0.44**	0.01	0.03	0.02
Standing long jump	0.11*	0.08	-0.04	0.07	0.21**	0.07	0.01	0.09	0.03
25meters run	-0.08	-0.25**	-0.07	-0.16	-0.11	0.04	-0.03	-0.01	0.15
Tennisball throw	0.01	0.12*	0.10	0.10	0.21**	0.17**	0.08	0.08	0.01

Control for the confounding of months age and sex

\*: p<0.05

\*\* : p<0.01

<sup>a</sup> the difference between the first and second measurements.

**Table 4 Correlation coefficients between birth weight and the results of fitness tests (Boys)**

Variables	First year			Second year			Amount of change <sup>a</sup>		
	Birth weight	Height	Weight	Birth weight	Height	Weight	Birth weight	Height	Weight
Birth weight	-			-			-		
Height	0.13	-		0.13	-		0.01	-	
Weight	0.27**	0.69**	-	0.21**	0.66**	-	-0.03	0.37**	-
Sit-and-reach	0.19*	0.17*	0.23**	0.16*	-0.01	0.03	-0.02	-0.01	-0.13
Grip strength	0.03	0.30**	0.34**	0.10	0.34**	0.41**	0.06	0.06	0.08
Grip strength (right)	0.05	0.31**	0.38**	0.09	0.34**	0.40**	0.04	0.12	0.17*
Grip strength (left)	0.04	0.30**	0.32**	0.11	0.31**	0.37**	0.02	0.04	-0.03
Standing long jump	0.08	0.05	0.02	0.07	0.13	0.02	0.04	0.09	-0.03
25meters run	-0.10	-0.12	0.04	-0.15	-0.11	0.04	-0.03	-0.03	0.15
Tennisball throw	-0.03	0.04	0.04	0.08	0.08	0.08	0.10	0.05	0.03

Control for the confounding of months age

\*: p<0.05

\*\* : p<0.01

<sup>a</sup> the difference between the first and second measurements.

served between birth weight and sit-and-reach scores in the first and second years (r=0.19 and r=0.16, **Table 4**). In the case of girls, birth weight exhibited a weak positive correlation with sit-and-reach (r=0.16), grip strength (r=0.20) and standing long jump (r=0.16) in the first year (**Table 5**). However, no significant correlations were observed between birth weight and annual changes in each discipline for either sex.

## Discussion

This study is the first to examine how birth weight is associated with longitudinal changes in the physical fitness of preschool children. The main findings obtained here were as follows: 1) birth weight showed a significant positive relationship with sit-and-reach scores in both measurements, standing long jump in the first measurement and grip strength score in the second measurement; and 2) the amount of annual

Table 5 Correlation coefficients between birth weight and the results of fitness tests (Girls)

Variables	First year			Second year			Amount of change <sup>a</sup>		
	Birth weight	Height	Weight	Birth weight	Height	Weight	Birth weight	Height	Weight
Birth weight	-			-			-		
Height	0.24**	-		0.24**	-		0.05	-	
Weight	0.29**	0.68**	-	0.29**	0.70**	-	0.15	0.34**	-
Sit-and-reach	0.16*	0.18*	0.15	0.15	0.14	0.18*	-0.02	0.05	0.00
Grip strength	0.20*	0.46**	0.45**	0.15	0.51**	0.52**	0.04	0.02	0.10
Grip strength (right)	0.17*	0.47**	0.41**	0.14	0.52**	0.50**	0.04	0.01	0.10
Grip strength (left)	0.20*	0.41**	0.43**	0.15	0.46**	0.50**	0.00	0.03	0.08
Standing long jump	0.16*	0.10	-0.09	0.08	0.32**	0.14	-0.03	0.09	0.10
25meters run	-0.06	-0.39**	-0.17	-0.17	-0.14	0.02	-0.03	0.00	0.15
Tennisball throw	0.07	0.23**	0.18*	0.12	0.33**	0.25**	0.05	0.14	-0.03

Control for the confounding of months age

\*: p<0.05

\*\* : p<0.01

<sup>a</sup>. the difference between the first and second measurements.

change in each physical fitness score was not related to birth weight. These results indicate that in preschool children aged 4 to 6 years, birth weight associates with sit-and-reach and grip strength scores, but it does not affect the magnitude of annual changes in physical fitness during the preschool term. Although the number of studies examining physical performance in preschool children is limited, the records of each test in this study were similar to those in another study for both sexes<sup>8)</sup>.

Sit-and-reach scores in both the first and second measurements, standing long jump in the first measurement, and hand grip strength in the second measurement were significantly correlated with birth weight. To the best of our knowledge, no study has clarified the relationship between sit-and-reach scores and birth weight in preschool children. This is a novel point in describing preschool children fitness. The sit-and-reach test is widely used as a simple method for measuring hamstring and low back flexibility<sup>9,10)</sup>. Some studies have reported that sit-and-reach scores increases with age in elementary school students and above<sup>11,12)</sup>. Sit-and-reach scores are also reported to be influenced by sitting height and upper limb bone length<sup>13)</sup>. These findings suggest that performance in the sit-and-reach

test may be affected by body growth. However, these studies did not show how the sit-and-reach score is associated with birth weight. In the present study, there was no significant difference in the sit-and-reach test performance between the first and the second year. Also, birth weight is significantly related to sit-and-reach scores even after adjustment for age in months. This indicates that birth weight may be independently associated with sit-and-reach scores.

In addition, birth weight influenced the standing long jump score in the first measurement. No study has identified a relationship between birth weight and jumping ability in preschool children. One study, which examined elementary school children, observed a significant relationship between birth weight and standing long jump in 7 year old boys<sup>4)</sup>, but others failed to show corresponding association. The performance of the standing long jump is a complex movement, consisting of explosive muscular strength of the lower limbs but also requires a swinging motion of the arm and a well-timed step-off motion<sup>7,9,14,15)</sup>. The current results indicate that in preschoolers, the greater the birth weight, the greater the ability to accomplish such complex movements.

Furthermore, grip strength was also significantly positively correlated with birth weight.

However, left- and right-hand grip strengths were more strongly correlated with current height and weight than birth weight. These results suggest that grip strength may be more strongly influenced by height and weight at the time of measurement than birth weight.

The present study indicates that there is no significant association between the annual change in physical fitness during early childhood and birth weight. The results of this study suggest that children born with low birth weight show lower performance in flexibility, grip strength, and jumping ability from the early childhood stage. It was also suggested that the differences may not be reduced in the early childhood stage. The changes in flexibility, muscle strength, and jumping ability observed in school children are more dramatic than those seen in preschoolers<sup>16,17)</sup>. Furthermore, the growth in muscle strength, jumping ability, and general endurance from infancy to adulthood is more pronounced between the ages of 9 and 13, and is related to puberty<sup>18)</sup>. Therefore, it was suggested that higher levels of physical fitness during the preschool years in preparation for significant growth during adolescence may be beneficial for future athletic ability and performance. Physical fitness during preschool years is useful to predict future individual growth and development in clinical settings where preschool children are taught. Furthermore, it is plausible to provide individualized sports guidance to promote sports throughout life. As previously noted, the percentage of children with low birth weight in Japan is increasing, which is an exceptional phenomenon compared with other countries. In Japan, prenatal management, such as nutrients managing birth weight during pregnancy, in addition to postnatal training, is crucial for athletes to reach their optimal performance.

This study has certain limitations. For sit-and-reach, the method of measurement that differs between countries. Further examination is needed to clarify whether the present findings can be adapted to other races. As previously

mentioned, performance in the sit-and-reach test may be influenced by body size, and the subject's current body size should be considered. Moreover, given that the present study involved assessments of preschool children, several limitations should be acknowledged. First, although the physical fitness tests employed were designed to minimize measurement error, it was difficult to accurately evaluate such error using intraclass correlation coefficients (ICC). Second, the duration of measurement periods adopted in the present study may have been too short to reveal the longitudinal changes in the physical capabilities of preschool children. Furthermore, as the data used in this study were secondarily obtained from City A, it was not possible to determine the sample size in advance. Future research should address these limitations in order to more accurately elucidate the relationship between birth weight and physical fitness in preschool children. Another limitation of this study was that it did not consider the amount of daily physical activity and family structure, which are presumed to be related to physical fitness. Previous studies have found an association between birth weight and physical activity, and that daily physical activity is a component of physical ability<sup>19,20)</sup>. Nevertheless, our study revealed correlations between birth weight, flexibility, grip strength and jumping ability in infancy. These findings help us understand the profiles of physical development in preschool children.

## Conclusion

The current study indicated significant correlations between birth weight and sit-and-reach, grip strength performance in both sexes, and standing long jump performance in girls. However, no annual changes in physical fitness were found to be related to birth weight. In addition to postnatal training, prenatal nutritional management in Japan is crucial for athletes to reach their optimal performance.

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### Conflicts of Interest

None.

### Author Contribution

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## 未就学児における運動能力の年間変化量と出生時体重との関係

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【要旨】 出生時体重は，学齢期の持久力，筋力，跳躍力に影響を及ぼすことが知られている。しかしながら，未就学児では，出生時体重が運動能力の縦断的变化とどのように関連しているかは明らかになっていない。本研究は，未就学児における2年間の縦断的データから，運動能力の年間変化量と出生時体重との関連を明らかにすることを目的とした。4～6歳の未就学児312名(男女各156名)を対象に，身体測定(身長，体重，BMI-SDS)，運動能力測定(長座体前屈，握力，立ち幅跳び，25m走，テニスボール投げの5種目)を年1回，2年間実施した。出生時体重と運動能力の結果との関係を偏相関分析により検討した。出生時体重は，両年の身長，体重，長座体前屈，1年目の立ち幅跳び，2年目の握力の成績と有意な弱い正の相関関係を示した。また，出生時体重は，男子で両年の長座体前屈，女子では1年目の長座体前屈，握力，立ち幅跳びの成績と有意な弱い正の相関関係を示した。しかしながら，全ての運動能力測定項目の年間変化量は，出生時体重とは関連していなかった。本研究は，4～6歳の就学前児童において，出生時体重が長座体前屈や立ち幅跳び，握力の能力と関連し，その差は就学前の段階では縮まらない可能性があること，アスリートが高いパフォーマンスを発揮するためには，産後のトレーニングに加えて産前の栄養管理が重要である可能性があることを示唆している。