

A STUDY OF FOUR PHYSICAL CHARACTERISTICS OF TWINS FROM THE SOUTH MORAVIAN REGION (ČSSR)

PRELIMINARY REPORT
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Genetics and physical characteristics of twins have always been major fields of interests for the physical anthropologists. There are many studies dealing with genetic questions which have provided valuable data for basing deductions of the effect of heredity and environment (Newman 1937, 1942, Osborn, De George 1959, Fišerová et al. 1968). Nevertheless, on the other hand, relatively few studies have been designed to investigate growth and development of twins with regard to those of general population (Stanincová, Ditrichová 1964).

In this study growth and bodily development of twins from the South Moravia region according to four fundamental physical traits (body height, weight, chest and head circumferences) are described and the comparison of the obtained data with those of the Czech general population is discussed.

MATERIAL AND METHODS

The material used in this study consisted of 27 pairs of identical twins (*EZ* ♂♂ = 11, *EZ* ♀♀ = 16) and 198 pairs of fraternal twins (*ZZ* ♂♂ = 58, *ZZ* ♀♀ = 64, *PZ* ♂♀ = 76). These twins were anthropologically investigated during the semilungitudinal research of twins conducted at the Pediatric Research Institut in Brno.

The boys and girls, varyaing in age from 7 to 14 years (see table 2), came from the South Moravian region. Only healthy children were included in this sample.

The criterion for determination of zygotic characters was an examination of the blood and serum systems (*A-B-O*, *M-N-S-s*, *Pp*, *Rh*, Lewis, Kell-Cellano). The diagnosis of the twins was completed partly by dermatoglyphic analysis on fingers, palms and soles, partly by the clinical picture of the twins and finally by the polymorphism of amylasis.

The examined characters (body height, weight, chest and head circumferences) were measured according to conventional anthropological methods of Martin—Saller (Fetter et al. 1967). For testing each character the method of normalized characters was used (Suchý 1964). Normalization of character was calculated according to the formula:

$$i = \frac{\bar{x} - x}{s}$$

where

- i* = the value of normalized character,
- x* = established value of the studied character (e.g. body height, weight etc.),
- \bar{x} = mean value of such a character according to the Czech general population,
- s* = standard deviation according to the Czech general population.

As the value of \bar{x} and *s* the data of nation-wide research of the basic bodily characteristics were used (Fetter, Suchý 1966).

TAB. I
Total for body height, weight, chest and head circumferences of twins expressed with the aid of normalization of character (*i*) (age 7—14)

Character	Identical (monozygotic) twins		Fraternal (dizygotic) twins			
	<i>EZ</i> ♂♂ (<i>N</i> = 11)	<i>EZ</i> ♀♀ (<i>N</i> = 16)	<i>ZZ</i> ♂♂ (<i>N</i> = 58)	<i>ZZ</i> ♀♀ (<i>N</i> = 64)	<i>PZ</i> ♂♀ (<i>N</i> = 76)	
Height	−0.01	−0.29	−0.09	−0.17	−0.04	+0.08
Weight	−0.20	−0.36	−0.22	−0.33	−0.45	−0.48
Chest circumference	−0.61	−1.00	−0.33	−0.69	−0.56	−0.86
Head circumference	−0.66	−0.33	−0.33	−0.64	−0.61	−0.93

TAB. 2
 Body height (cm), weight (kg), chest and head circumferences (cm) of twins from the South Moravian region
 (\bar{x} = mean value of the character examined, i = the value of a normalized character)

Age	Sex	Identical (monozygotic) twins						Fraternal (dizygotic) twins								
		EZ			ZZ			EZ			ZZ					
		N (pairs)	Height	Weight	Chest circum- ference	Head circum- ference	N (pairs)	Height	Weight	Chest circum- ference	Head circum- ference	sex/N	Height	Weight	Chest circum- ference	Head circum- ference
7	♂♂	3	123.3 +0.65	23.5 0.00	58.1 -0.05	50.5 -0.75	16	122.4 +0.29	22.5 -0.19	58.3 -0.35	51.2 -0.26	♂/7	123.4 +0.09	23.4 +0.08	58.5 -0.58	50.5 -0.83
	♀♀	—	—	—	—	—	16	121.2 -0.16	20.0 -0.25	57.7 -0.50	51.0 -0.31	♀/7	125.9 +0.75	24.0 +0.17	58.5 -0.41	49.8 -0.67
8	♂♂	1	122.7	23.2	58.2	50.5	20	127.7	25.6	61.2	51.6	♂/26	127.1	25.7	60.0	50.8
	♀♀	5	124.7 -0.78	23.5 -0.88	57.5 -1.04	50.5 -1.00	25	125.0 -0.22	24.9 -0.39	58.7 -0.73	50.5 -0.63	♀/26	126.9 +0.05	25.6 -0.25	61.9 -0.25	50.2 -0.55
9	♂♂	—	—	—	—	—	8	137.5	29.1	65.2	51.6	♂/10	134.1	27.2	62.5	51.9
	♀♀	3	129.5 -0.45	29.5 -0.15	62.3 -0.15	50.1 -0.55	13	130.6 -0.29	25.5 -0.72	60.7 -0.81	50.8 -0.55	♀/10	137.7 +0.14	25.2 -0.52	64.1 -0.30	50.6 -1.14
10	♂♂	7	138.6 +0.25	30.5 +0.25	64.7 -0.61	52.3 -0.55	8	138.5 -0.04	29.7 -0.51	64.5 -0.55	51.5 -0.91	♂/28	138.0	30.0	65.4	51.8
	♀♀	2	137.5 -0.09	28.5 -0.75	63.5 -0.75	52.5 +0.45	6	141.6 +0.58	34.8 +0.46	62.8 -0.41	51.9 -0.25	♀/28	137.1 +0.12	22.8 -0.72	63.0 -0.70	50.8 -1.20
11	♂♂	—	—	—	—	—	2	140.0	35.1	69.5	52.0	♂/3	135.0	29.0	63.5	51.6
	♀♀	—	—	—	—	—	—	-0.45	+0.24	-0.08	-0.69	♀/3	-1.45	-1.42	-1.07	-1.33
12	♂♂	—	—	—	—	—	2	148.4	36.1	69.5	53.5	♂/2	143.0	34.0	69.0	52.0
	♀♀	2	147.0 -0.28	44.7 +0.36	77.0 +0.43	53.0 +0.05	2	147.0 -0.69	35.2 -0.79	69.5 -0.75	52.0 -0.25	♀/2	149.0 0.00	36.5 -0.59	67.0 -0.45	51.0 -1.62
13	♂♂	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	♀♀	2	157.5 -0.25	42.5 -0.58	74.5 -0.41	53.8 -0.08	—	—	—	—	—	—	—	—	—	—
14	♂♂	—	—	—	—	—	2	155.8	48.8	70.5	54.0	—	—	—	—	—
	♀♀	2	165.0 +1.08	55.0 +0.45	85.0 +0.51	56.5 +1.68	2	156.0 -0.37	44.6 -0.77	77.0 -0.40	52.0 -1.00	—	—	—	—	—

RESULTS AND DISCUSSION

Mean normalized values of height, weight, chest and head circumferences of the twins (boys and girls) without respect to their age are given in table 1.

As shown on this table, body height and weight of the identical and fraternal twins are approximate by the same as those of the Czech general population. As for the chest and head circumferences, however, significant differences between the twins and the general population were proved. It can be seen that the twins show lower average values of chest and head circumferences than those of the general population. These differences are conspicuous especially in mixed pairs.

More is to be found in table 2, where mean values (\bar{x}) of the studied characters as well as the relevant normalized values (i) separately in eight age-groups of boys' and girls' pairs as well as mixed ones are given.

In conformity with data mentioned above it has been found that average values of body height and weight of the identical twins as well as the fraternal ones in most age-groups are conformed to the relevant standards of the general population. As regards two remaining traits, however, there are differences between the twins and the general population. In case of chest and head circumferences a temporary retardation of the development of these traits was observed not only in the identical but also in the fraternal twins. A temporary retardation in development of these circumferences can be seen in the identical twins in the age of 7 to 10 years while during their maturation the obtained data are in conformity with those of the general population. As for the fraternal twins (ZZ, PZ) retardation appears in all age-groups studied.

If we estimate the bodily development of the twins in all age-groups in the light of four characteristics we can see that not only identical but also fraternal twins in comparison with the Czech general population before their maturation and partly during their maturation are slightly retarded. This phenomenon has been known yet and the reasons of which have been often discussed, nevertheless they are not yet quite clear. The low birth weight of twins has been often held for one of the reasons of bodily retardation. It has been shown that children coming from multiple birth and having a lower birth weight than those of general population are retarded in their bodily development. The question, however, in what age this bodily handicap of twins is disappeared, has been still open. Some authors have stated that twins in the age of three years show the same basic bodily characteristics as general population (Stanincová, Ditrichová 1964), on the other hand, others have noted that the low birth weight influences the actual weight of children not only during their prematurity but also during their maturation (Drob-

ný 1965, Jung et al. 1969, Machová, Gutvirth 1970). Our findings have been in conformity with those mentioned above, nevertheless they have made no answer the question concerning the removal of differences in bodily development of twins. In the future further study will be necessary to complete these gaps.

SUMMARY

The aim of the present paper was to find if identical and fraternal twins in the age of 7 to 14 years coming from the South Moravian region grow and develop with respect to four basic bodily characteristics (body height, weight, chest and head circumferences) according to the relevant standards of the Czech general population.

It was found that: (1) identical and fraternal twins without regard to their age show in average the same body height and weight as children of the general population. However, as for their chest and head circumferences lower values than relevant standards have been found (table 1) and (2) by study of development changes of four physical traits in the twins certain features of bodily retardation have been found, especially in case of circumference parameters (table 2).

REFERENCES

- DOLEŽALOVÁ V., DOLEŽAL A., TITLBACHOVÁ S., DÝČKA J., 1967: Donošené děti s nízkou porodní váhou v pražské populaci. *Čs. gynekologie* 32: 673—678.
- DROBNÝ I., 1965: Antropometrické charakteristiky žiakov prvých tried a ich vzťah k výskytu ťažkosti adaptácie. *Sborník „Určovanie duševného vývinu dieťaťa.“ Slov. ped. nakl. Bratislava.*
- FETTER V., PROKOPEC M., SUCHÝ J., TITLBACHOVÁ S., 1967: Antropologie. *Academia Praha.*
- FETTER V., SUCHÝ J., 1966: Die grundlegenden körperlichen Charakteristika der heutigen jungen Generation in der Tschechoslowakei. *Anthropologie* 4, 2: 41—54. *Brno.*
- FIŠEROVÁ J., HAJNÍŠOVÁ M., KUBÍČKOVÁ Z., DVOŘÁČKOVÁ M., BOHÁČOVÁ J., 1968: Some results of somatometric examination of twins. *Anthropologie* 6, 3: 111—113. *Brno.*
- JUNG G., LEMPP R., SCHMIDT R., 1969: Das Schicksal der Frühgeburten. *Archiv für Kinderheilkunde* 179: 111—124.
- NEWMAN H., H., FREEMAN F., N., HOLZINGER K., J., 1937: Twins: A study of heredity and environment. *Chicago, Univ. of Chicago Press.*
- NEWMAN H., H., 1942: Twins and super-twins: A study of twins, triplets, quadruplets and quintuplets. *Hutchinson's sc. a. tech. public. London, New York, Melbourne.*
- OSBORN R., H., De GEORGE F. V., 1959: Genetic basis of morphological variation. *Cambridge, Harvard univ, press.*
- STANICOVÁ V., DITRICHOVÁ J., 1964: Vývoj dětí s nízkou porodní váhou do 3 let věku. *Házkova sbírka* 5. *Praha.*
- SUCHÝ J., 1964: Untersuchungen an Zigeunerkindern in West- und Nordböhmen. *Arzliche Jugendkunde* 55: 151—158.

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