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CHANGES IN THE BIRTH WEIGHT, BIRTH LENGTH, AND HEAD CIRCUMFERENCE OF HUNGARIAN CHILDREN IN COUNTY BARANYA BETWEEN 1968 AND 1979–81

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Abstract: *Possible secular changes of newborn's body measurements were investigated in a cross-sectional growth study in County Baranya (South Hungary) in 1979–81 years on a sample of 2130 infants. The findings were compared with those of Fekete et al. (1968, 1974) obtained in the same region on 3567 neonates. During the 12-years interval the birth weight of children slightly increased, the head circumference did not change in girls but slightly decreased in boys. The birth length values could not be evaluated because of the technical reason. According to the results secular changes in the newborn body measurements could not have been realised during the period investigated. The fetal growth standard of Fekete et al. (1968, 1974) is still suitable and a repeated anthropometric investigation of newborns is necessary in the near future.*

Key words: *Birth weight; Biorth length; Head circumference; Baranya county / Hungary.*

Introduction

The phenomenon known as secular trend concerns physical maturation of children occuring more rapidly and children becoming larger at all ages, even at birth (Tanner 1966, Van Wieringen 1978, Susanne 1984, Eiben 1988). It is clear that among causes of secular changes in growth and maturation the changes in socioeconomic and demographic factors are of special importance.

Between the 1960s and early 1980s markerd demographic and socioeconomical changes occured in Hungary, consequently in County Baranya, some selected indeces of which are shown in the *Table 1.*

Table 1. **Some sociodemographic data of Baranya County changed during the period investigated**

Sociodemographic data	1968	1980
The number of inhabitants	177 000	434 340
Birth rate (‰)	15.3	13.7
Natural increase	2.5	0.3
Infant mortality, 0—365 days	42.8	20.6
The ratio of workers of the hand and brain	3.2	2.4
Number of physicians per 10 000 inhabitants	28	36

Since intrauterin growth charts were constructed in 1968 in our county with performed body measurements in 1979–81 in order to see whether significant changes had occured and a secular trend could be demonstrated.

Material and Methods

Body measurements were performed in 2130 newborn infants, 1073 boys and 1057 girls (*Table 2*) in the neonatal unit of the Baranya County Hospital between February 1, 1979 – March 31, 1980 and January 1, 1981 – May 31, 1981. The data covered all "healthy" liveborn singletons of estimated gestational age of 30–41 weeks. Infants with major congenital abnormalities, erythroblastosis or marked fetal malnutrition, infants born to diabetic mothers were not included.

Table 2. **The number of patients by age and sex in the Baranya–I and Baranya–II**

Gestational age (weeks)	Baranya–I (Fekete et al. 1974) Boys	Girls	Total	Baranya–II (present study) Boys	Girls	Total
30	31	37	68	5	9	14
31	33	30	63	10	3	13
32	43	34	77	6	8	14
33	37	32	69	12	7	19
34	49	47	96	19	25	44
35	49	59	108	29	22	51
36	110	88	198	45	63	108
37	104	72	176	95	83	178
38	203	160	363	183	184	367
39	328	299	627	301	297	598
40	411	391	802	257	246	503
41	262	229	491	111	110	221
Sum total	1886	1681	3567	1073	1057	2130

The gestational age of babies was calculated from the first day of the last normal menstrual period. In every case clinical assessment of gestational age was performed by the Dubowitz scoring system (1970). Whenever a definite date of the last normal period was not stated or the calculated gestational age was not compatible with the obtained by clinical assessment, the infant was not included.

All the measurements were made in duplicate in the first 36 hours of age, by the same person using an infant scale (made by Metripond, type N° 292), an infant length measuring board and a flexible narrow steel tape. The measurements include birth weight, length (the crown-heel length) and the head circumference.

Birth length measurements were made with the infant flat on his back, head touching the crib end, both knees straight and pressed to the matress, and feet at left angles. Head measurements were made with light pressure using a flexible narrow steel tape arround the largest occipitofrontal circumference.

In the course of mathematical-statistical evaluation, the usual parameters were calculated (x = means, SD = standard deviation), by which the results of the two investigations (Baranya–I of Fekete et al. 1968, 1974 and the present study Baranya–II) were comparable. The statistical differences were computed by Student *t*-test.

The results are shown in the *Tables 3–8.*

Results

In Baranya–II the mean *birth weight* values of newborn babies, 170–190 grams in boys at 35–37 and 39 gestational weeks, 90–190 grams in girls at 36–39 weeks were haevier than in Baranya–I. The difference at other gestational weeks was not significant (*Tables 3–4*).

Table 3. **Birth weight (g) in boys**

Gestational age (weeks)	Baranya–I (Fekete et al. 1968, 1974) x	SD	Baranya–II (present study) x	SD	P
30	1580	350	1750	215	NS
31	1740	370	1810	265	NS
32	1920	420	1990	390	NS
33	2130	440	2260	380	NS
34	2350	450	2530	340	NS
35	2560	450	2750	325	+
36	2800	470	2990	360	++
37	3040	480	3210	370	++
38	3220	460	3340	380	NS
39	3340	460	3430	395	++
40	3420	460	3480	405	NS
41	3480	460	3520	450	NS

+ + + $p < 0.001$; + + $p < 0.01$; + $p < 0.05$ NS; Baranya–II > Baranya–I
– – – $p < 0.001$; – – $p < 0.01$; – $p < 0.05$ NS; Baranya–I > Baranya–II

Table 4. **Birth weight (g) in girls**

Gestational age (weeks)	Baranya–I (Fekete et al. 1968, 1974) x	SD	Baranya–II (present study) x	SD	P
30	1540	390	1710	255	NS
31	1700	410	1770	305	NS
32	1850	380	1920	350	NS
33	2050	400	2180	340	NS
34	2270	450	2450	340	NS
35	2480	480	2670	355	NS
36	2660	480	2850	370	++
37	2820	440	2990	330	++
38	2970	440	3090	360	++
39	3100	430	3190	365	++
40	3210	420	3270	465	NS
41	3280	420	3320	410	NS

+ + + $p < 0.001$; + + $p < 0.01$; + $p < 0.05$ NS; Baranya–II > Baranya–I
– – – $p < 0.001$; – – $p < 0.01$; – $p < 0.05$ NS; Baranya–I > Baranya–II

In Baranya–II the mean *birth–length* of newborns was smaller by 1.6–3.9 cm in boys and by 1.5–4.6 cm in girls at 34–41 gestational weeks than in Baranya–I (*Tables 5–6*).

Table 5. **Birth length (cm) in boys**

Gestational age (weeks)	Baranya–I (Fekete et al. 1968, 1974) x	SD	Baranya–II (present study) x	SD	P
30	42.1	3.60	42.6	2.42	NS
31	43.4	3.30	42.8	2.01	NS
32	44.7	3.20	43.5	1.83	NS
33	46.2	3.50	44.9	1.80	NS
34	47.6	3.40	46.0	1.71	– – –
35	49.0	3.20	47.0	1.42	– – –
36	50.4	3.00	47.7	1.60	– – –
37	51.7	2.90	48.3	1.64	– – –
38	52.7	2.80	48.9	1.71	– – –
39	53.5	2.80	49.6	1.63	– – –
40	54.1	2.90	50.2	1.60	– – –
41	54.6	3.00	50.9	1.84	– – –

+ + + $p < 0.001$; + + $p < 0.01$; + $p < 0.05$ NS; Baranya–II > Baranya–I
– – – $p < 0.001$; – – $p < 0.01$; – $p < 0.05$ NS; Baranya–I > Baranya–II

Table 6. **Birth length (cm) in girls**

Gestational age (weeks)	Baranya–I (Fekete et al. 1968, 1974) x	SD	Baranya–II (present study) x	SD	P
30	42.4	3.60	42.9	2.42	NS
31	43.6	3.50	43.0	2.21	NS
32	44.8	3.50	43.6	2.03	NS
33	46.0	3.50	44.7	1.80	NS
34	47.2	3.40	45.6	1.71	–
35	48.5	3.40	46.5	1.62	– – –
36	49.7	3.20	47.0	1.80	– – –
37	50.9	3.10	47.6	1.84	– – –
38	51.9	3.00	48.4	1.91	– – –
39	52.6	3.00	48.9	1.83	– – –
40	53.1	3.10	49.5	1.80	– – –
41	53.2	3.00	50.1	1.84	– – –

+ + + $p < 0.001$; + + $p < 0.01$; + $p < 0.05$ NS; Baranya–II > Baranya–I
– – – $p < 0.001$; – – $p < 0.01$; – $p < 0.05$ NS; Baranya–I > Baranya–II

In Baranya–II the mean head circumference of newborn babies were very similar to those of Baranya–I, except at the gestational ages of 39–40 in girls, where the Baranya–II mean head circumference values were bigger, than those of Baranya–II (*Tables 7–8*).

Table 7. **Head circumference (cm) in newborn boys**

Gestational age (weeks)	Baranya–I (Fekete et al. 1968, 1974) x	SD	Baranya–II (present study) x	SD	P
30	28.7	2.04	29.6	1.85	NS
31	29.6	2.10	29.7	1.87	NS
32	30.3	1.90	30.3	1.53	NS
33	31.0	1.70	31.1	1.47	NS
34	31.7	1.80	31.8	1.37	NS
35	32.4	1.80	32.5	1.22	NS
36	33.1	1.70	33.1	0.73	NS
37	33.7	1.41	33.6	1.16	NS
38	34.2	1.34	34.3	1.27	NS
39	34.7	1.41	34.5	1.24	NS
40	35.1	1.38	34.6	1.14	NS
41	35.5	1.41	34.7	1.36	NS

+ + + $p < 0.001$; + + $p < 0.01$; + $p < 0.05$ NS; Baranya–II > Baranya–I
– – – $p < 0.001$; – – $p < 0.01$; – $p < 0.05$ NS; Baranya–I > Baranya–II

Table 8. **Head circumference (cm) in newborn girls**

Gestational age (weeks)	Baranya–I (Fekete et al. 1968, 1974) x	SD	Baranya–II (present study) x	SD	P
30	28.4	2.20	29.3	2.01	NS
31	29.4	2.20	29.5	1.97	NS
32	30.1	2.10	30.1	1.73	NS
33	30.8	2.20	30.9	1.81	NS
34	31.6	2.20	31.7	1.77	NS
35	32.1	1.90	32.2	1.32	NS
36	32.5	1.70	32.7	0.73	NS
37	33.0	1.60	32.9	1.35	NS
38	33.3	1.40	33.4	1.34	NS
39	33.8	1.40	33.6	1.25	–
40	34.0	1.36	33.5	1.12	– – –
41	34.3	1.44	34.0	1.39	NS

+ + + $p < 0.001$; + + $p < 0.01$; + $p < 0.05$ NS; Baranya–II > Baranya–I
– – – $p < 0.001$; – – $p < 0.01$; – $p < 0.05$ NS; Baranya–I > Baranya–II

Discussion

The birth weight in the youngest age groups (30–34th weeks) have not changed at all. The increase of birth weight in the elder age groups (35–37th and 39th weeks) during the investigated period was very small.

The decrease of birth length probably is the consequence of technical reasons. In the study of Fekete et al. (1968, 1974) the length of the baby was usually measured with a tape, a measuring table was routinly not used. In our survey the length was determined with a measuring tagle, which resulted in our experience in a shorter length. Anyhow, this tecnical error or discrepancy between the two studies does not permit to draw conclusions concerning a secular trend.

The boy's head circumferences have not changed, but the girls's values even have slightly decreased in the elder age groups (39–40th gestational weeks).

According to the results the following conclusions can be made:

(1) The differences seen in the values of some gestational age groups were biologically insignificant and did not mean a consequent tendency valid for the whole material. Secular changes in general in the newborn body measurements could not be realised during the investigated period.

(2) The intrauterine growth standards of Fekete et al. (1968, 1974) are still suitable.

(3) Since currently more dramatic social, economical and health care changes occur than in the examination period of the present paper, more expressed anthropometric alterations can be expected in the next future. Therefore repeating of the growth studies are necessary in our region.

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