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DATA ON THE BIOLOGICAL DEVELOPMENT OF GIRLS IN SOMOGY COUNTY (PRELIMINARY STUDY)

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Abstract

The biological status of 15 per cent (1201) of the 10-14-year-old girls in Somogy County was investgated in 1995-96. The height, weight and age at menarche were studied by the status quo method and probit analysis. The median age at menarche was 12.63 years. The results indicate a positive secular trend in the somatic development of girls in Somogy County during the past 50 years.

Key words: Somogy County girls, age at menarche, height, weight.

Introduction

The age at the appearance of the menarche is one of the most important attributes in the biological development of girls. It mostly appears after the adolescent growth spurt, at the end of puberty.

In recent decades, a number of Hungarian researchers have studied the age at menarche and the genetic and environmental factors influencing it (BODZSÁR, 1975; BOTTYÁN et al., 1963; EIBEN and PANTÓ, 1985; EIBEN, 1988; FARKAS, 1990, EIBEN et al., 1991). A correlation has been thought between the menarche and the body composition (PANTÓ, 1980; PÁPAI and BODZSÁR, 1990; BODZSÁR, 1991), and the interrelationship between the age at menarche and physical performance has been studied (PÁPAI et al., 1992). The publications reveal that the age at menarche is determined by genetic endowments and environmental factors. It is clear that the age at menarche is appearing earlier and earlier; the onset of puberty occurs much sooner than 50-100 years ago.

Investigations have been carried out on the growth and maturation of children living in Somogy County (Southern Hungary) since the early part of this century. The first was performed among kindergarten and primary school children between 1928 and 1931 by a paediatrician GYÖRGY VÉLI (1936). He wrote several papers on the growth and maturation of Kaposvár children (VÉLI, 1967, 1968). He proposed that, instead of acceleration, it would be better to speak about the elimination of the earlier retardation. BODZSÁR and VÉLI (1980) published data on the physical development of young people

in Kaposvár. KÖRNYEI et al. (1980, 1983) investigated 1806 Kaposvár children and published their body measurements and the age at menarche in girls (1983). GELENCSÉR et al. (1986) analysed the changes in height, weight and age at menarche in the past 50 years from the aspects of a secular trend. VÁSÁRHEGYI (1985) presented data on the age at menarche in Nagyatád. At the beginning of the 1980s, within the scope of the Hungarian National Growth Study, a representative growth survey (organized and directed by Prof. O. G. EIBEN), a sample of 974 boys and girls was investigated in Somogy County (EIBEN et al., 1990).

The results of these studies demonstrate a positive secular trend in the growth of children and in the age at menarche in the past 50 years. Some authors have pointed out a relatively new phenomenon: the positive secular trend of the menarcheal age stopped for a short time, and subsequently later menarche medians were reported than before from the same place (ROBERTS and DANN, 1967, 1975; KÁDÁR and VÉLI, 1977; RONA, 1981; EIBEN, 1988).

The question arose of whether this secular trend in the age at menarche still exists in girls in Somogy County in recent decades. Since the study is still in progress, some preliminary data are presented in this paper.

Material and methods

The area of this study is Somogy County, which is situated in the south-western part of Hungary, south of Lake Balaton. The study was carried out in the school year 1995-96. In the selection of the localities, the author considered the previous places of research in Somogy County, the number of inhabitants and/or the size of the settlements, and the distribution of children according to age between 10 and 14 years by settlements. It was planned to involve 20% of the 10-14-year-old Somogy County children in the investigation. Height, weight and menarche data on 1201 girls were measured in the county-town Kaposvár and in other towns and villages in Somogy County. The anthropometric programme involved 18 body measurements according to the MARTIN technique (MARTIN and SALLER, 1957), with regard to the recommendations of the International Biological Programme (TANNER et al., 1969). Data on menarcheal age were collected by the status quo method, and the median was calculated by means of probit analysis.

Result and discussion

Table 1 compares the mean height and weight data between the foregoing studies in Kaposvár and Somogy County and the results which were measured by myself among Somogy County girls. These parameters have continued to increase. The changes are particularly marked at the ages of 10-11. The 10-year-old was on average 6 cm taller in 1996 than in the eighties, and 13 cm taller than in 1947. This indicates the earlier appearance of the puberty growth impulse. Among 12-14-year-olds, there is not such a significant change, but there is still an increasing tendency. It is clear there is a positive seculary trend that in the development of both height and weight.

Table 2 shows the distribution of pre- and postmenarcheal girls. It can be seen that the 10-11-year-olds include postmenarcheal girls although in small number. As compar-

ed with the data from 1947 and 1962 (VÉLI, 1968), the changes are noteworthy: VÉLI did not find any girls in this age group who had menstruated.

Table 1. Mean heights and weights of 10-14-year-old Kaposvár and Somogy County girls.

Year of the investigation and author		Height (cm)					Weight (kg)				
		10	11	12	13	14	10	11	12	13	14
1947	*N*	172	169	161	175	147	172	169	161	175	147
VÉLI (1968)	*Mean*	132.2	137.3	143	147.8	154.7	28.4	32	35.5	40	47.2
1962	*N*	16	92	259	360	282	16	92	259	360	282
VÉLI (1968)	*Mean*	140.1	142.0	148.1	153.6	157.0	32.6	34.8	39.7	44.7	48.6
1975	*N*	283	300	257	278	292	283	300	257	278	292
BODZSÁR and VÉLI	*Mean*	137.7	143.8	149.8	156.3	159.8	31.1	35.9	39.9	46.4	49.7
(1980)	*SD*	6.3	7.3	7.1	6.5	4.7	6.1	7.9	7.8	8.4	8.8
1978	*N*	128	100	115	139	101	128	100	115	139	101
KÖRNYEI et al.	*Mean*	138.0	144.3	151.4	156.1	159.5	32.6	34.7	40.5	46.0	48.4
(1980)	*SD*	7.4	6.7	7.7	6.1	4.9	7.0	6.5	7.7	8.3	6.2
1981	*N*	134	124	104	114	100	134	124	104	114	100
KÖRNYEI et al.	*Mean*	138.0	144.5	151.6	156.4	160.0	32.7	35.9	43.3	47.3	51.0
(1983)	*SD*	7.5	7.3	7.1	7.1	6.0	7.8	6.6	9.9	9.7	6.7
1982	*N*	30	28	34	33	35	30	28	34	33	35
EIBEN et al.	*Mean*	139.4	144.7	150.2	155.2	157.6	32.3	37.0	42.4	46.3	49.8
(1990)	*SD*	7.6	6.9	7.1	6.6	5.1	8.0	9.0	11.5	8.5	6.6
1996	*N*	91	243	297	343	194	91	243	297	343	194
SUSKOVICS	*Mean*	145.4	146.3	152.1	156.7	160.3	37.7	39.2	44.0	48.3	52.7
	SD	7.4	7.0	7.7	6.6	7.3	7.5	9.9	10.6	10.6	9.8

Table 2. Distribution of the premenarcheal and postmenarcheal girls in Somogy County.

Age (years)	N	Postmenarcheal		Premenarcheal	
		N_1	%	N_2	%
10,0	4	1	25.00	3	75.00
10,5	87	4	4.60	83	95.40
11,0	112	8	7.14	104	92.86
11,5	131	13	9.92	118	90.08
12,0	161	41	25.47	120	74.53
12,5	136	61	44.85	75	55.15
13,0	150	93	62.00	57	38.00
13,5	193	159	82.38	34	17.62
14,0	138	127	92.03	11	7.97
14,5	56	52	92.86	4	7.14
15,0	16	14	87.50	2	12.50
15,5	8	7	87.50	1	12.50
16,0	9	9	88.89	0	0.00

Table 3 presents the mean heights and weights of the pre- and postmenarcheal girls, from Figs 1 and 2. The data clearly reveal that the postmenarcheal girls are much taller and heavier than their postmenarcheal contemporaries. There is a positive relation between the body development and the menarche. According to "critical body weight" theory of FRISCH and REVELLE (1969), the attainment of a certain weight may be critical from the point of view of menarche. This specific weight leads to changes in the metabolism. If there is a role of the weight at the growth speed peak in the appearance of the menarche, the earlier secular trend is explainable. FRISCH and REVELLE (1969) claims that a critical weight cause the menarche: 47-48 kg. The present research results

indicate that the postmenarcheal girls have a mean weight of 42.33-60.14 kg, compared with 35.90-46.60 kg for the premenarcheal girls. Comparison of the age at menarche m=12.63 years with its nearest age average 50.25 kg body weight indicates that on average girls aged 12.5 years have reached FRISCH and REVELLE "critical body weight". This theory of "critical body weight" is valid in the Somogy County sample. The results confirmed that the menarche appears in the year following the largest growth of the body, the puberty growth impulse peak (VÉLI, 1968).

Table 3. Height and weight of premenarcheal and postmenaercheal girls in Somogy County.

Age (year)	Height (cm)				Weight (cm)			
	Premenarcheal		Postmenarcheal		Premenarcheal		Postmenarcheal	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
10	146.93	3.86	162.30	0.00	40.00	5.00	47.00	0.00
10.5	143.53	5.87	152.73	8.31	35.90	6.76	42.33	4.93
11	146.04	6.09	155.43	6.50	38.27	9.50	60.14	9.89
11.5	148.34	8.00	156.70	7.84	39.93	9.42	52.58	10.91
12	150.20	6.99	155.13	6.04	40.66	8.69	52.15	8.63
12.5	152.50	8.32	157.04	6.02	42.78	9.28	50.25	9.66
13	154.33	6.23	157.53	5.28	43.18	8.84	51.73	11.63
13.5	158.23	5.89	159.64	7.10	45.96	9.82	52.66	9.32
14	161.08	11.60	160.57	6.73	46.60	9.52	52.70	9.63
14.5	161.53	2.98	160.02	8.59	45.75	2.06	51.67	9.29

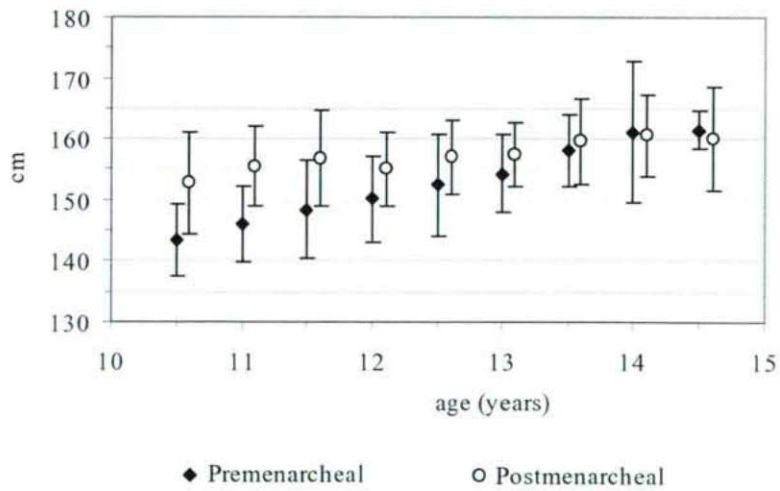

Fig. 1. Height of the premenarcheal and postmenarcheal County Somogy girls.

Table 4 detailes the Somogy County median data of relating to the age at menarche. VÉLI reported that the age at menarche was in 1947 in Kaposvár m=13.9 years. There has subsequently been a downward tendency. The age at menarche has

been approximately constatnt during the past 15 years, though the Hungarian National Growth Study found a minimum of m=12.55 years in Somogy County in 1982, which was the lowest age from any county (EIBEN et al., 1990). In comparison with this a slightly higher age at menarche has been found in 1996. Taking everything into consideration, it seems that the positive secular trend in the development of the age at menarche is currently not very marked. At the beginning of the eighties, the samples collected from all over Hungary gave the age at menarche for the whole of the country as m=12.79 year (EIBEN et al., 1990). The menarche median for girls living in Somogy County (m=12.63) is earlier than that. BODZSÁR (1975) found m=12.61 years in Székesfehérvár in 1971, CSÓKA et al. (1981) m=12.58 years in Csepel in 1970-80, BODZSÁR (1983) m=12.61 in Veszprém in 1978, EIBEN et al. (1991) m=12.4 years in Budapest during the longitudinal growth research between 1970 and 1988.

Table 4. Somogy County data relating to the age at menarche.

Site of sampling	Time of sampling	Age at menarche (year)	Author and year of publication
Kaposvár	1947	13.90	VÉLI 1968
Kaposvár	1962	12.98	VÉLI 1968
Kaposvár	1981	12.69	KÖRNYEI et al. 1983
Somogy County	1982	12.55	EIBEN et al. 1990
Nagyatád	1982	12.63	VÁRHEGYI 1985
Somogy County	1996	12.63	SUSKOVICS (present study)

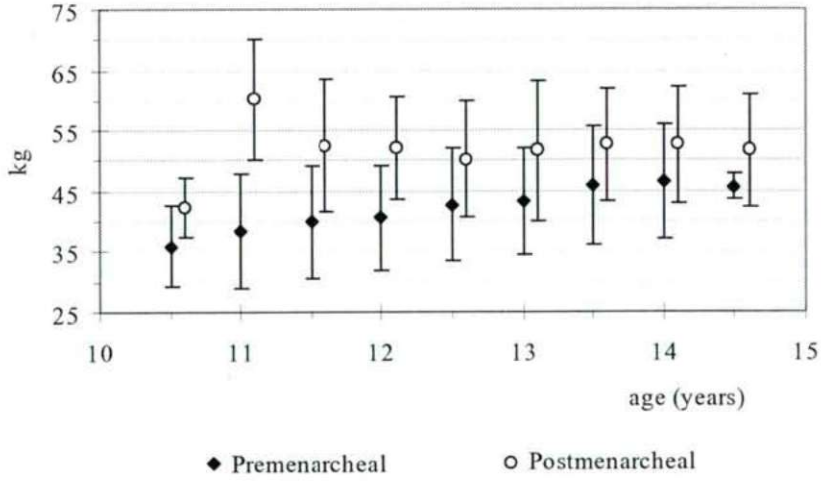

Fig. 2. Weight of the premenarcheal and postmenarcheal County Somogy girls.

Summary

The biological status of 15 per cent (1201) of the 10-14-year-old girls in Somogy County was investigated in 1995-96. The study extended to the height, weight and the age at menarche by the status quo method and probit analysis. The median age at menarche was m=12.63 years. It can be stated that there has been a positive secular trend in the past 50 years in the somatic development of girls in Somogy County.

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