

## STUDIES ON THE MENARCHEAL AGE OF THE GIRLS OF COUNTY CSONGRÁD (SOUTHERN HUNGARY)

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### Abstract

A review is given of the method of a research work carried out in county Csongrád (Southern Hungary) between the period 1981 and 1984. Using the literature of this topic, authors report on the purpose of the research: the joint studying of the physical, social and biological factors influencing the puberty of girls. The study comprises 20.000 girls from the age of 10—18 years, and also determines the main body measurements of the boys of similar age.

As the first partial result of this research, authors report on the parameters of four body measurements of nearly 7000 girls of Szeged (body height, body weight, normal breast circumference, bi-crystal width) as well as the menarcheal age.

Key words: menarche, body development, girls, Hungary.

### Introduction

It could be said on the basis of reviewing the international literary data that studies have been carried out on the time of the first menstruation of girls and the factors influencing it in many countries, from several viewpoints. The literature of the topic is extremely large. Most of the experiments, however, only focussed on the determination of the median in the studies aiming to determine the menarcheal age. It also became evident on the basis of the observations so far that this age could be related to several factors.

These influencing factors could be divided into four groups:

1. social factors, 2. biological factors connected with the body endowments, 3. naturally, and 4. other factors (FARKAS, 1980.) However, the influence of these factors on the time of maturation could not be made clear as yet.

The opinions regarding the effect of the factors could also be divided into three groups:

1. The effects of certain factors are unanimously presumed, but the degree and trend (negative or positive) of the effects are not known completely yet.

Thus, it is known that radioactive radiation has retarding effect (BURROW et al., 1965), nevertheless, its degree — since luckily we do not have enough data — is not known yet.

Similarly, it is also known that the first menstruation during the whole calendar year is not uniform in a population, but seasonal variations can be observed (BOJLÉN and BENTZON, 1968, 1971; BREIPOHL, 1938; BURREL et al. 1961; FARKAS, 1971), however, the relative frequency regarding each calendar month may differ even within a population, although the coincidence of the months of birth and menarche is almost identical in the same population (EIBEN and BODZSÁR, 1970; FARKAS, 1971). ENGLE and SHELESNYAK (1934) were the first to call the attention to the seasonal variations — which are related with all probability to the habits and time of marriage and consequently, the time of birth, too.

The genetical factors also determine the period of puberty (CHERN, 1973; TISSERAND-PERRIER, 1953).

During the past 100 years the time of puberty pushed to a more and more earlier age (acceleration), which has been observed by many authors (AMUNDSEN and DIERS, 1969, 1973; BACKMAN, 1948), and which can even be observed during a few decades (FARKAS, 1969), but the degree of acceleration may vary.

2. Such effects could be ranked into the second group, which produced different opinions.

Certain authors who studied the occupation of the parents found that the daughters of intellectual parents reach the age of puberty earlier than those of manual worker parents (BARISIĆ and GAVRILOVIĆ, 1974; RICHTER, 1973; BODZSÁR, 1975). Others did not find such relationships (BER and BROCHNER, 1964; ROBERTS and DANN, 1967; ROBERTS et al. 1971). We ourselves have found this relationship unanimously on the basis of the occupation of fathers, however, this did not prove to be true in the case of mothers.

It is a generally accepted opinion that the girls living in the Northern regions become mature later than those living in countries of warmer climate. Furthermore, different median can be observed even with the slight modification of the height above sea level (FARKAS, 1979a), while in other areas no connections could be demonstrated between the geographical position and the menarche median (GRIMM, 1958; ŁASKA-MIERZEJEWSKA, 1970).

The financial situation (average income) of the family plays a role as a demonstrable effect in certain countries (AW and TYE, 1970), while others contradict the significance of this, or at least the connection between the time of puberty and the economical situation of the family is not unambiguous (BAI and VIJAYALAKSHMI, 1973).

Similar uncertainty can be experienced in the judgement of the effect of other factors, also, like the quality composition of food and the mode of meals (DREIZEN et al., 1967; CARFAGNA et al., 1973; ŠKERLJ, 1947), the body development (RICHTER, 1973; WINICK, 1975; FARKAS and SZEKERES, in press), the number of brothers and sisters (FARKAS et al., in press; ŠTUKOVSKÝ et al. 1967; SOENDEROP et al. 1961; SCOTT, 1961; ROBERTS, 1977), and the climate (FOLL, 1958; FARKAS, 1979a).

3. Finally there are such opinions, too, according to which the time of the first menstruation shows complete variation (ROBERTS and DANN, 1967), making its dependence on the afore-mentioned factors practically unrecognizable.

In all probability the opinion of SCHWENK stands closest to the truth, according to which author the causes producing menarche are not known well enough as yet, but it is very likely that the variations in the amount of oestrogens also play a large role in this (SCHWENK, 1965).

With the above cited opinions we only wished to bring a few examples as evidence for those reported above, emphasizing that this is only a fragment of the huge literary data on the topic, the complete listing of which is unnecessary and impossible in this report.

These opinions could not even be definitely cleared by the observations in Hungary so far, even though a few studies had been reported on even earlier (BOTTYÁN et al., 1963; BODZSÁR, 1975; EIBEN, 1972).

According to our opinion the followings are the main causes for this:

a) the collection of data is generally done by status quo method (one single surveying and questioning) and there are only few observations originating from so-called longitudinal samples. (It is a fact, that this latter means a close to 10 years' research work in a child community).

b) authors mostly analyse their study material collected with the status quo method according to only one or a few viewpoints, although the studying of several factors can also be easily carried out in case of a single sampling, with the spending of relatively short time.

The collections of data accomplished by one of the authors since 1958 in Southern Hungary are also connected with these international researches, of which several reports have already been published (FARKAS, 1962; BÖTTYÁN *et al.* 1963; FARKAS, 1963, 1964, 1969, 1970, 1971, 1975, 1976, 1979a, 1979b, 1980; FARKAS and SZEKERES, *in press*).

The contradictions of the literary data as well as the practical experiences induced us to study the effects of possibly several factors in the case of one and the same child community, in the frame of larger sampling. On this basis we started a research work in 1981, the methods and first partial results of which are reported in the followings.

### Materials and methods

Our aim is to initiate in our study as many as possible girls of county Csongrád ranging from the age of 10—18 years. This is wished to be achieved in such a way that the collection of data is carried out in every primary and secondary school where the pupils are mostly girls. Only those are left out of the study, who are sick during the course of the surveying, are absent from school, or do not wish to take part in the supplying of data, which is voluntary. According to our judgement about 20,000 girls from the county will take part in the study, which means nearly 95% of the girls from the given age.

The 10—18 years of age limits were determined from a methodological point of view, since the evaluations are carried out by probit analysis, for which it is necessary to know the age when the girls do not menstruate yet, and also the age when 100% of them do. According to our experiences this falls between the above mentioned ages in case of the Hungarian girls. For the data collection such a study sheet was constructed (see enclosed) which contains the questions grouped according to topics and numbered.

A brief information for the parents and teachers is given of the purpose of the study on the data collecting sheet.

The following questions were ranged into groups (here we are also giving the serial number of each question in parentheses):

Data of identification. — serial number (1), permanent address (2), place of data collection (3), time-point of data collection (4), date of birth of pupil (5), occupation of father (6), occupation of mother (7), number of living and deceased brothers and sisters of pupil (8), how many brothers and sisters were born before the pupil (9), the results of her latest school certificate (10), the number of several organic diseases so far (11), number of operations (12).

Somatal data. — body weight (13), body height (14), normal breast circumference (15), bi-crystal width (16), development of pubic hair (17), development of underarm hair (18), development of breast (19).

Questions concerning menarche. — does the pupil have menstruation (20), if yes, exactly when (21), is it regular (22).

Data of parents. — year of birth of father (23), place of birth of father (24), highest school qualification of father (25), time of birth of mother (26), place of birth of mother (27), highest school qualification of mother (28).

Other questions. — weight at birth of pupil (29), does the pupil have a twin, if yes what is the twin's name (30), the time of first menstruation of mother (31), have the parents talked with their child about sexual questions (32), the member of the family filling out the form (33), what type of school does the pupil attend (34), colour of eyes (35), colour of hair (36).

The questions number 1, 3, 4, 13—19, 35—36 are filled out during the course of examination. The rest of the questions are requested to be filled out by the parents in such a way that the pupil takes the form home and asks for answers to the encircled questions from her parents.

The form is then taken back to school, partially filled out and the body measurements taken according to the specifications of MARTIN are written on the form (MARTIN and SALLER, 1956). The measurements are determined using anthropometer, scales measuring with 50 g exactness, steel measuring tape, and calipers (questions No. 13—16.). Each measurement is generally taken by the same person. The specifications of TANNER (1962) are followed in determining the secondary sexual characteristics (questions No. 17—19), the colours of the eye and hair are determined by the colour scales of FISCHER-SALLER and MARTIN, respectively.



During the course of the measurings, the exactness of the filling out of the forms is checked.

The evaluation of the data is carried out with R-40 type computer using the Osiris programme. The data collecting forms are coded for this procedure.

The settlements are divided into six categories on the basis of the number of the population of the living place and place of data collecting: settlements having more than 200,000 inhabitants; 200—100 thousand; 100—50 thousand; 50—10 thousand; 10—5 thousand inhabitants; less than 5 thousand inhabitants.

Taking a unified classification system as a basis, the occupations of the parents are divided into 9 categories: industrial manual workers; agricultural manual workers; manual workers in other fields; intellectuals with higher qualification (university, college); intellectuals with secondary qualification; pensioners; others; home workers; and those pupils whose either parents have died are ranked into a separate group.

On the basis of the parents' school qualification the following groups are differentiated: those who did not finish their primary school studies; those who had finished their primary school studies; those who received vocational training; those who have secondary school; college or university qualification.

Finally, the type of school is determined which the children attend: primary school; vocational school training (3 years); secondary school (4 years).

Since the punch card used for the R-40 type computer is prepared for 80 code signs, the question No. 33 is not coded (it would be the 81, code).

After taking the coded data on the punch card and following the processing in the computer the estimates received by the computer are checked until the errors are completely eliminated. During this course even those data can be deleted which are not true (e. g. wrong data are given).

The 34 different types of information give the possibility to have them evaluated independently as well as combined with each other. With this procedure further information can be gained. As an example, the pupils could be grouped according to the number of brothers and sisters, the parents' school qualification, the age differences between mother and father, etc., and in compliance with this we are able to determine the changes in the menarcheal median.

As it can be seen, the questions attempt to comprehend the viewpoints appearing in the international literature.

The studied pupils are divided into 8 groups before the evaluation by the computer as follows: girls and boys, resp. of Szeged; girls and boys, resp. of county Csongrád (the previous two groups are also comprised in this group); girls and boys, resp. from other counties; gypsy girls and boys, respectively.

According to our original intention the research would only have limited to the pupils of county Csongrád, however, during the course of the study it turned out that children from other counties also attend the schools in county Csongrád (schools giving vocational training and secondary schools). These had to be separated from those of county Csongrád, and will belong to a national comparative study, which will be amplified by data collection from other counties.

The students are divided into half-year age groups in every case and this is also performed with the help of a computer using the decimal life-table (see enclosed).

Apart from the girls, the boys are also measured in the case of coeducational schools, as this does not mean particular difficulty. In the case of boys, the time of birth, time of data collecting, address, body height and weight, as well as the normal breast circumference are recorded.

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Besides the authors, MRS. MARIANNE KALMÁR, assistant; MRS. ANNA SZEDERKÉNYI, statist; and GYÖRGY NÉMETH, also performing the coding, take part in the research work.

## Results

The work was started on the 23rd February, 1981 and the measurings are taken always by the same team. A total of 12,729 girls and 7537 boys were measured till July 31st, 1982. From these, the evaluation of the body measurements of 7000 girls and 2700 boys of Szeged has been accomplished by now. Tables 1.—4. show the important parameters of the body weight, height, normal breast circumference and bicipital width of the girls.

The findings until now, which are firstly related to the comparisons of the earlier data with the physical maturity of the 10 to 14.5 years old girls and boys of Szeged are summarized in a separate report to be published in this volume of *Acta Biologica Szeged-*

diensis (FARKAS, 1983). Here, we should only like to mention in brief that the body height and weight of the children belonging to the age group referred to above still show a lag compared to the averages of 1966/67.

The menarcheal median is 12.77 years on the basis of the present data, being practically unchanged compared to the median of 1966/67.

Finally, we should like to mention that related to this research, we have also studied the relationship between the fluoride content of drinking water and physical maturity, which study will partly be published in other periodicals (FAZEKAS et al., in press, FAZEKAS et al., 1984), and partly in this volume (FARKAS et al., 1983).

Decimal age table of I. B. P.

NAP	JAN 1	FEB 2	MAR 3	APR 4	MAY 5	JUN 6	JUL 7	AUG 8	SEP 9	OCT 10	NOV 11	DEC 12
1	000	085	162	247	329	414	496	581	666	748	833	915
2	003	088	164	249	332	416	499	584	668	751	836	918
3	005	090	167	252	334	419	501	586	671	753	838	921
4	008	093	170	255	337	422	504	589	674	756	841	923
5	011	096	173	258	340	425	507	592	677	759	844	926
6	014	099	175	260	342	427	510	595	679	762	847	929
7	016	101	178	263	345	430	512	597	682	764	849	932
8	019	104	181	266	348	433	515	600	685	767	852	934
9	022	107	184	268	351	436	518	603	688	770	855	937
10	025	110	186	271	353	438	521	605	690	773	858	940
	1	2	3	4	5	6	7	8	9	10	11	12
11	027	112	189	274	356	441	523	608	693	775	860	942
12	030	115	192	277	359	444	526	611	696	778	863	945
13	033	118	195	279	362	447	529	614	699	781	866	948
14	036	121	197	282	364	449	532	616	701	784	868	951
15	038	123	200	285	367	452	534	619	704	786	871	953
16	041	126	203	288	370	455	537	622	707	789	874	956
17	044	129	205	290	373	458	540	625	710	792	877	959
18	047	132	208	293	375	460	542	627	712	795	879	962
19	049	134	211	296	378	463	545	630	715	797	882	964
20	052	137	214	299	381	466	548	633	718	800	885	967
	1	2	3	4	5	6	7	8	9	10	11	12
21	055	140	216	301	384	468	551	636	721	803	888	970
22	058	142	219	304	386	471	553	638	723	805	890	973
23	060	145	222	307	389	474	556	641	726	808	893	975
24	063	148	225	310	392	477	559	644	729	811	896	978
25	066	151	227	312	395	479	562	647	731	814	899	981
26	068	153	230	315	397	482	564	649	734	816	901	984
27	071	156	233	318	400	485	567	652	737	819	904	986
28	074	159	236	321	403	488	570	655	740	822	907	989
29	077		238	323	405	490	573	658	742	825	910	992
30	079		241	326	408	493	575	660	745	827	912	995
31	082		244		411		578	663		830		997
	1 JAN	2 FEB	3 MAR	4 APR	5 MAY	6 JUN	7 JUL	8 AUG	9 SEP	10 OCT	11 NOV	12 DEC

Table 1. Parameters of body height. Girls

Age	n	$\bar{x}$	s	w
10.0	38	142.63	7.25	127.9—158.8
10.5	395	141.50	6.61	124.2—160.0
11.0	487	144.80	7.35	126.7—166.8
11.5	480	147.77	7.48	128.9—172.0
12.0	473	151.03	7.20	127.8—172.5
12.5	474	153.73	6.94	134.8—178.7
13.0	528	156.01	6.88	134.6—180.1
13.5	466	158.33	6.85	126.7—177.1
14.0	392	159.32	6.04	124.0—174.2
14.5	377	159.82	5.92	132.2—174.4
15.0	512	160.07	6.04	141.3—180.1
15.5	485	161.03	6.36	140.7—178.3
16.0	475	160.39	6.07	128.5—181.3
16.5	407	160.71	7.04	125.4—190.0
17.0	365	161.17	6.43	138.5—178.1
17.5	244	160.94	5.94	147.7—176.1
18.0	184	162.18	5.39	149.8—176.4
18.5	87	161.42	7.15	149.0—180.4
19.0	10	162.63	5.91	154.7—171.9
	6879			

Table 2. Parameters of body weight. Girls

Age	n	$\bar{x}$	s	w
10.0	38	35.44	6.71	25.0—53.4
10.5	395	35.70	7.75	21.2—77.4
11.0	487	37.53	8.82	22.4—82.9
11.5	480	39.68	8.71	22.2—70.7
12.0	473	42.97	9.28	25.3—75.2
12.5	474	45.80	9.72	24.2—84.8
13.0	528	47.29	9.72	27.3—90.3
13.5	466	50.43	11.06	25.5—96.4
14.0	392	51.84	8.89	28.4—91.3
14.5	377	53.12	9.68	31.0—93.9
15.0	512	54.75	9.28	33.1—90.9
15.5	485	55.63	9.30	34.7—96.3
16.0	475	55.17	8.54	35.7—87.2
16.5	407	55.86	8.52	29.4—86.2
17.0	365	56.47	8.71	35.5—99.8
17.5	243	55.86	8.14	40.3—89.1
18.0	184	57.14	8.13	43.2—86.1
18.5	87	56.21	8.58	32.7—78.9
19.0	10	55.81	5.13	47.9—65.3
	6878			

Table 3. Parameters of normal chest circumference. Girls

Age	n	$\bar{x}$	s	w
10.0	38	66.84	5.58	59—84
10.5	395	67.33	7.24	53—97
11.0	487	68.72	7.78	55—103
11.5	480	70.63	7.75	53—99
12.0	473	73.59	8.05	57—103
12.5	474	76.38	8.28	54—105
13.0	528	77.94	8.31	60—109
13.5	466	80.40	9.20	61—105
14.0	392	81.66	7.34	63—113
14.5	377	83.30	7.99	59—111
15.0	512	84.66	7.41	66—114
15.5	485	85.49	7.40	69—115
16.0	474	85.50	6.92	72—110
16.5	407	85.57	6.77	53—110
17.0	365	86.61	6.99	70—113
17.5	244	86.28	7.27	65—112
18.0	184	86.49	7.17	59—111
18.5	87	86.40	6.67	70—105
19.0	10	85.20	3.22	81—91
	6878			

Table 4. Parameters of bicristal width. Girls

Age	n	$\bar{x}$	s	w
10.0	38	22.22	1.50	20.0—26.7
10.5	395	22.21	1.56	18.2—28.1
11.0	487	22.79	1.82	18.0—31.2
11.5	480	23.29	1.82	18.2—29.5
12.0	473	24.09	1.80	19.2—29.6
12.5	474	24.70	1.93	18.8—31.5
13.0	528	25.25	1.79	20.9—32.4
13.5	466	25.73	1.85	19.1—33.1
14.0	392	25.97	1.69	20.0—32.0
14.5	376	26.55	1.81	20.6—36.7
15.0	512	26.82	1.64	22.7—31.8
15.5	482	26.97	1.71	20.1—33.4
16.0	473	27.04	1.58	22.2—32.0
16.5	407	27.19	1.65	22.5—35.0
17.0	361	27.38	1.57	22.2—32.4
17.5	244	27.34	1.70	21.0—33.1
18.0	184	27.59	1.56	23.5—31.6
18.5	87	27.39	1.71	22.7—31.0
19.0	10	28.23	1.61	25.5—31.0
	6869			



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