

COMPARISON OF SOMATIC CHARACTERS IN MENSTRUATING AND NON-MENSTRUATING GIRLS

GY. FARKAS and T. TAKÁCS

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Abstract

Authors compared the means of body height, body weight, chest circumference on normal breathing and iliac diameter, as well as the standard ranges of them, resp., in the case of over 20 thousand 10.5-15.5 year old menstruating and non-menstruating girls. It was determined that the lower and upper end values of the standard ranges were higher for the menstruating girls in the case of every character.

Key words: menstruating and non-menstruating girls, body height, body weight, chest circumference, iliac diameter.

Introduction

Among the factors influencing the puberty of girls, as well as the factors connected with this, the body measures are also frequently taken into account by the various authors. From these the body weight is considered to be a character of emphasized importance.

One part of the publications stresses that the body weight of menstruating girls is higher in comparison to their non-menstruating companions of similar age (CSÓKA et al. 1981; FARKAS and SZEKERES, 1982). This determination is firstly results from the comparison of the arithmetic means and is an obvious phenomenon if taking into consideration that the puberty of girls is preceded by the peak height velocity.

The other part of authors approach this question from another side, referring to the fact that the girls of greater weight menstruate earlier than those of less weight (KANERO et al. 1970; RICHTER, 1973), resp., the menarche starts sooner in the case of fatter girls than thinner ones (ŠELAKOVIĆ and BURKA, 1978). Others have found that the menstruation starts in precox majority in obese girls (VEŠIĆ et al. 1978). There are also data pertaining to the menarche-retarding effect of thinness and intensive sport activity (VANDENBROUCKE et al. 1982).

FRISCH had linked the starting of menarche directly with a critical body weight, which he determined as 47.8 ± 0.5 kg (FRISCH, 1974). This conclusion, however, has been disputed by many (FARKAS and SZEKERES, 1982; PESTHY, 1984).

Those authors who either link the appearance of the menarche to a defined body weight, or speak of the greater weight of those menstruating do not emphasize the followings:

1. The statements are mostly based on the comparison of the arithmetic means, which point out the common features but conceal the individual cases.

2. In the case of menstruating, the higher arithmetic mean is in tight connection with the peak height velocity.

3. There are girls — not so few in number — who do not reach the indicated critical body weight, still the menarche appears and, resp., the menarche does not regularly start in the case of girls of greater weight, either.

4. The race is completely left out of consideration when determining the critical body weight. It is not likely that the critical body weight given by FRISCH would be applicable for example to the Vietnamese, Laotian, Korean, or very low negritid girls.

Therefore, we feel that the connection between the body measures and the appearance of the menarche needs more exact explanation.

Sample and method

In an earlier paper one of the present authors had expounded in detail the data collection performed between 1981 and 1984 concerning the factors influencing the puberty of Hungarian girls (FARKAS et al. 1983). On the basis of this work, possibility is also open for dealing with the question of the connection between the body measures and the menarche, and menstruation, resp., on the basis of a survey on a high number of sample elements.

In order to approach the problem four body measures of girls belonging to the age group of 10.5–15.5 years were taken as a base (body height, body weight, chest circumference on normal breathing, biiliac diameter). From the individual data evaluated with an R-55 type computer, the sample size (n), arithmetic means (\bar{x}) and standard deviation (s) according to age groups are at our disposal. These parameters are shown in Tables 1, 4, in the case of menstruating and non-menstruating girls according to age groups and characters.

Table 1. Parameters of body height for menstruating and non-menstruating girls

Age	Menstruating girls			Non-menstruating girls		
	n	\bar{x}	s	n	\bar{x}	s
10.5	27	151.5	6.63	1413	141.3	6.65
11.0	85	152.5	6.58	1784	144.1	6.83
11.5	212	154.9	5.98	1826	146.5	6.97
12.0	470	155.6	5.99	1448	149.1	6.93
12.5	851	156.5	5.98	1179	151.3	6.77
13.0	1173	157.7	6.12	857	153.2	6.67
13.5	1523	158.7	5.99	480	154.6	7.06
14.0	1676	159.5	5.96	275	156.6	6.84
14.5	1845	159.9	5.94	127	156.7	6.15
15.0	2085	160.8	5.99	50	158.3	7.46
15.5	1887	160.9	5.94	17	158.3	8.22
Total:	11834			9456		

Table 2. Parameters of body weight for menstruating and non-menstruating girls

Age	Menstruating girls			Non-menstruating girls		
	n	\bar{x}	s	n	\bar{x}	s
10.5	27	48.7	10.34	1413	35.1	7.22
11.0	85	47.8	9.75	1784	36.8	7.76
11.5	212	48.9	8.57	1825	38.6	8.52
12.0	470	49.7	9.06	1448	40.3	8.07
12.5	852	50.5	9.08	1179	41.7	8.31
13.0	1172	50.4	8.28	857	42.5	7.98
13.5	1523	51.8	9.38	480	43.0	7.50
14.0	1675	52.2	8.67	275	44.4	7.65
14.5	1846	53.7	8.94	127	45.4	8.48
15.0	2077	54.5	8.68	50	46.3	7.19
15.5	1883	55.0	8.24	17	46.5	8.08
Total:	11822			9455		

Using the arithmetic mean and the standard deviation so-called standard ranges were formed according to age groups (standard range = $\bar{x} \pm 1.96s$) for each character in the case of menstruating, and not yet menstruating girls. The standard ranges formed in the above manner are shown according to characters in Figs. 1-4.

Table 3. Parameters of chest circumference on normal breathing for menstruating and non-menstruating girls

Age	Menstruating girls			Non-menstruating girls		
	n	\bar{x}	s	n	\bar{x}	s
10.5	27	80.0	8.18	1413	67.0	6.67
11.0	85	79.3	8.22	1784	68.5	7.00
11.5	212	79.9	7.65	1825	70.2	7.64
12.0	470	80.6	7.45	1448	71.7	6.95
12.5	851	81.5	7.43	1179	73.2	7.12
13.0	1170	81.3	6.90	857	73.8	6.79
13.5	1524	82.6	7.75	480	74.5	6.37
14.0	1676	82.8	7.08	275	75.5	6.16
14.5	1846	84.3	7.34	127	77.6	7.83
15.0	2084	84.9	6.88	50	77.6	6.05
15.5	1887	85.3	6.78	17	79.0	6.78
Total:	11832			9455		

Table 4. Parameters of iliac diameter for menstruating and non-menstruating girls

Age	Menstruating girls			Non-menstruating girls		
	n	\bar{x}	s	n	\bar{x}	s
10.5	27	25.0	1.51	1412	22.3	1.55
11.0	85	24.8	1.82	1783	22.8	1.61
11.5	212	25.2	1.56	1820	23.2	1.70
12.0	469	25.4	1.62	1447	23.7	1.63
12.5	851	25.6	1.61	1179	24.2	1.67
13.0	1169	25.9	1.55	856	24.5	1.67
13.5	1511	26.1	1.66	477	24.7	1.68
14.0	1664	26.3	1.60	273	25.0	1.57
14.5	1841	26.6	1.65	125	25.3	1.69
15.0	2084	26.8	1.58	50	25.8	1.57
15.5	1883	27.0	1.58	17	25.6	2.13
Total:	11796			9439		

Observations were only made from the 10.5 year age group during the analysis, since the number of those already menstruating among the younger girls is extremely low. On the other hand, the girls older than 15.5 years were not taken into consideration because in this case the number of those not yet menstruating is few, and thus even the somatic data related to them can be regarded to be unreal. Even besides such approach our observations concern more than 20 thousand girls.

The differences between the arithmetic means per character of the menstruating and non-menstruating girls were checked by two-sampled Student's test.

More detailed information regarding the techniques of the data collection are comprised in earlier publications (FARKAS et al. 1983).

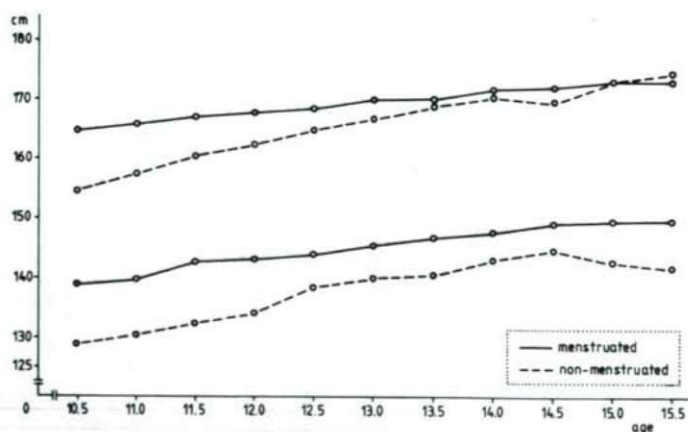


Fig. 1. $\bar{x} \pm 1.96s$ interval of the body height of menstruating and non-menstruating girls

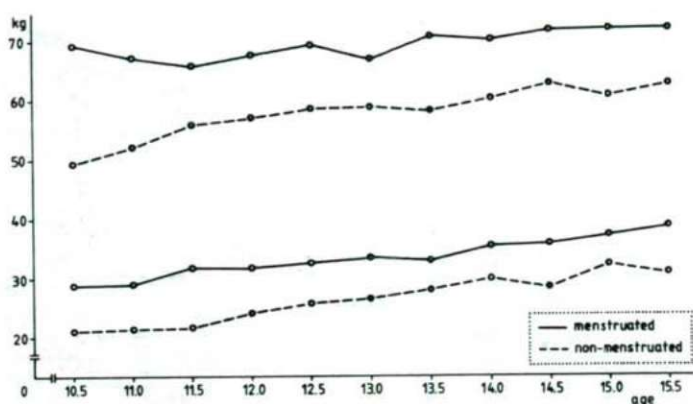


Fig. 2. $\bar{x} \pm 1.96.s$ interval of the body weight of menstruating and non-menstruating girls

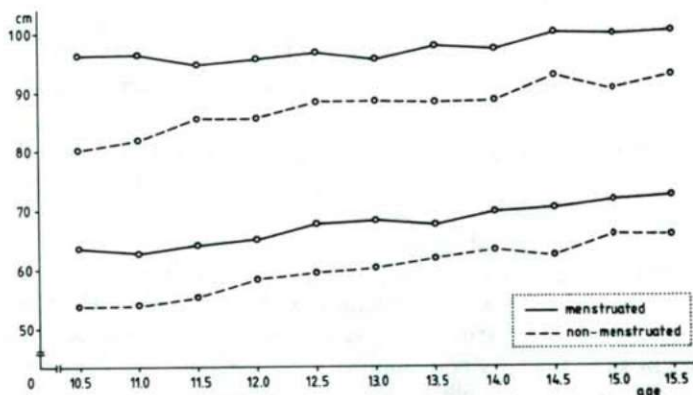


Fig. 3. $\bar{x} \pm 1.96.s$ interval of the chest circumference on normal breathing of menstruating and non-menstruating girls

Results

It is clear from the comparison of the arithmetic means shown in Tables 1.-4. that for all four characters and every age group the mean values of the menstruating girls are essentially higher.

With two-sampled Student's test the deviation between the means of the two part-samples could only be verified at 90% probability level in the case of the body height of the 15.5 year old girls, while in the rest of the cases and age groups the means of the body measures for the girls already reaching puberty proved to be

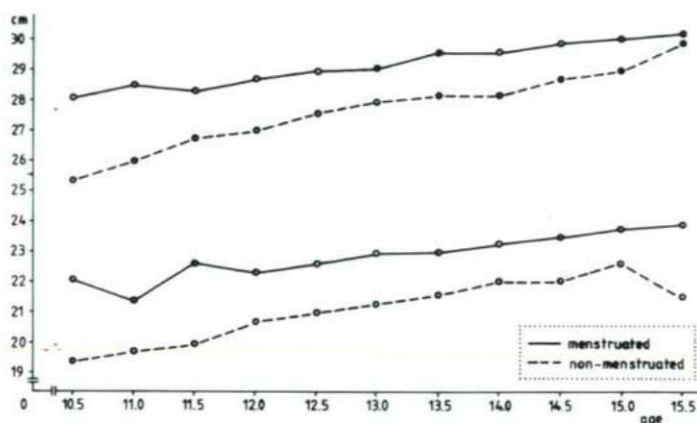


Fig. 4. $\bar{x} \pm 1.96s$ interval of the biiliac diameter of menstruating and non-menstruating girls

higher at a probability level of 98–99.9%. In the case of the 15.5 year old girls this exception can be explained by the low number of the non-menstruating girls as well as the relating high dispersion value.

Thus the observation that the means of the body measures of the girls already reaching puberty are higher than the ones not reaching puberty yet can practically be supported on the basis of the arithmetic means.

In the case of the standard ranges formed with the help of the arithmetic means and the standard deviations, the lower and upper end values of the standard ranges ($=\bar{x} \pm 1.96s$) regarding the menstruating girls are higher than the respective parameters of still not menstruating girls in case of every character and each age group. This can by no means be explained by the standard deviations, since these are higher concerning body weight and chest circumference on normal breathing, and are lower regarding body height in every age group of the already menstruating girls, contrary to those not menstruating yet. In respect to biiliac diameter, the standard deviation values for the menstruating girls aged 11, 14 and 15 were found to be higher, and in the rest of the age groups lower compared to the girls not reaching puberty yet.

Similarly to the arithmetic means, the standard deviation, in standard ranges of the two groups are evidently in connection with the peak height velocity.

In respect to the body weight, on the basis of our studies such high values for this measure were found in every age group of the non-menstruating 10.5–14 year old girls which even surpassed the upper limit of the standard range for the already menstruating girls.

At the same time, such minimal body weight occurred in the 15 year old age group of the menstruating girls, which is fell below the lower value of the standard range for the girls not reaching puberty yet.

If we accept the assumptions that

1. puberty is restricted to a critical body weight, and
2. the girls of greater body weight reach puberty sooner than those of less weight, then apart from the very high body weight, no explanation could be given to the lack of the menarche in the case of the 10.5–14 year old non-menstruating girls.

According to our judgement, therefore, it is completely incorrect to restrict the time-point of puberty to a defined body weight, and in general, only to the body weight. These conspicuous cases unambiguously support that the neuroendocrine system has great effect on the beginning of puberty, since the somatic characters are not only influenced by the neuroendocrine effects, but also to a great extent by the environmental factors.

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Address of the authors:

GY. FARKAS

T. TAKÁCS

Department of Anthropology

Attila József University

H-6701 Szeged,

P.O. Box 660.

Hungary