NOTES ON THE PUBERTY DEVELOPMENT OF ADOLESCENTS

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Data available concerning the beginning, duration and characteristic features of puberty development assume an ever increasing significance in medicine and biology, and more particularly, in the study of health and developmental regularities in the growing organism. The practical implication of the problem outlined augments also by virtue of the fact that during the last centenial, in many countries worldwide Bulgaria inclusive (8, 13), an earlier sex maturation, representing an important link of the so-called acceleration phenomenon is being noted.

Puberty development of younger generations in this country has been the object of numerous investigations during the past few years. It is discussed independently (1, 6, 12, 13), or in correlation with other body dimensions (2, 9, 10), and peculiarities of the higher nervous activity (3, 14). The influence exerted by genetic and social-economical factors, such as urbanization, labour, mode of living, nutrition, sports and the like has been also underscored (8, 9, 12).

Material and method

In the present work an analysis is made of results of a representative research into 1326 boys and 1385 girls, aged 8 to 18 years, from the district of Tolbuhin. Secondary sex signs are assayed on the basis of a 4-point scoring system which is a method generally adopted in this country (7, 8, 13, 14). The mean menarche age is calculated on the basis of anamnestic data. The data are elaborated after the methods of variational statistics. A comparative study with other analogical investigations, performed in Bulgaria in the past, is also made.

Results and discussion

The first signs of puberty development in the boys occur at 9 years of age (Table 1). The leading signs are enlargement of the sex organs and pubic region hairing. Initially, the latter lags behind insignificantly, but after the 13th year of life, it anticipates the development of external genitals.

Subaxillary hairing begins at the age of ten years. In comparison with the signs described above, a lagging behind of the second and third degrees is noted, initially by 0.5—1 year, and in 18-year-old subjects — by more than two years. At the end of the age period surveyed, subaxillary hairing was incomplete in 23.6 per cent of the school children under study. Formation of the sign after the age indicated has been described by other authors too (5, 13, 14). In the literature the opinion prevails that it is a matter of a phenomenon by no means isolated, and therefore should not be interpreted as a lagging behind of puberty development.

Table 1

Relative Share of Boys Lacking Evidence of and with Completed Development of the Secondary Sex Signs

A. Lacking evidence of development

Age	Hairing of upper lip and chin	External genitals	Axillary hairing	Pubic region hairing
1	2	3	4	5
9	0	93.8	0	93.7
10	0	77.6	98.6	88.8
11	99.3	48.6	96.4	66.4
12	94.3	37.4	84.6	40.7
13	64.4	6.7	56.7	10.6
14	42.3	0.8	20.3	2.5
15	17.5	0	5.8	1.7
16	7.0	0.9	0.8	0
17				

B. With completed development

I	2	3	4	5
13	0	0	0	10.6
14	0	8.9	4.1	89.0
15	0	37.5	20.8	59.9
16	7.8	69.6	37.4	83.5
17	17.2	93.1	58.8	96.2
18	43.4	99.1	76.4	100.0

Hairing of the upper lip and chin is delayed by one year compared to subaxillary one, whereas compared to the other secondary sex signs — by 2 to 2.5 years. Formation of the last degree in most of the teenagers under review (56.6 per cent) proceeds also after the age limit indicated.

In isolated cases puberty development of girls begins at the age of eight years (Table 2).

The development of mammary glands and pubic region hairing run a parallel course at equal rates. Axillary hairing initiates about a year thereafter. Formation of the latter sign, as in boys, occur later compared to the other signs assayed, although to a lesser degree.

The comparative analysis of sex-related differences accompanying puberty changes shows that girls anticipate both in the initial and final terms of development. This is very clearly outlined by the mean age at which the signs under study occur (Table 3).

The data in the above table demonstrate the consecutiveness in the development of secondary sex signs, claimed by many authors. By comparison with analogical researches, performed by D. Mateev and H. Seizov, an acceleration in the occurrence of most of the signs assayed is observed. Although the results obtained refer to different territories and districts, they give us

Table 2

Relative Share of Girls Lacking Evidence of and with Completed Development of the Secondary Sex Signs

A. Lacking evidence of development

Age	Subaxillary	Pubic region hairing	Mammary glands development
9	100.0	98.4	97.7
10	91.2	65.8	64.9
11	58.6	39.3	40.0
12	31.9	16.0	16.0
13	5.0	0.8	0.8

B. With completed development

1	2	3	4
12	0.9	3.4	1.7
13	3.3	28.9	32.3
14	15.2	41.1	45.7
15	35.7	67.9	77.7
16	58.1	87.9	85.1
17	66.9	93.1	93.1
18	91.3	99.0	100.0

Table 3

Comparative Data about the Mean Age of Secondary Sex Signs' Occurrence

Signs	Boys			Girls	
	D. Mateev	H. Seizov	Personal data	D. Mateev	Personal data
Upper lip and chin hairing	14.8	13.9	13.8	—	—
Development of external genitals	—	12.0	11.2	—	—
Pubic hairing	—	12.0	11.6	10.2	10.8
Axillary hairing	13.8	13.2	13.1	11.7	11.4
Development of mammary glands	—	—	—	10.8	10.7

sufficient reason to accept that in this country the process of acceleration is in course. In support of the latter statement are also the results obtained anamnestically, and concerning the age at menarche (Table 4). As compared to the past, the relative share of girls with early occurrence of mensis is increased at the expense of those aged 14 years and older ones. Up to the 13th year of life, 32.5 per cent of the girls inquired have already menstruation. The mean age of its occurrence is 12.45 yrs, and approximates the age established by L. Petkova (11) concerning school girls from Sofia. The fall of the age at menarche, compared to the research data of P. Noykov and D. Katzarov (1919), mounts to three months per each 10-year period (Table 4).

Table 4

Comparative Data about the Age at Menarche (% of Girls with Mensis)

Author and year of stuty	Age in years				Mean age at menarche
	9—11	12—13	14—15	16—20	
S. Vatev (1904—6)	0.9	14.7	69.1	25.3	15.2
P. Noykov, D. Katzarov (1914—15)	0	50.0	42.5	7.5	13.8
D. Mateev (1935—36)	0	51.3	45.2	3.5	13.1
H. Seizov (1953)	11.2	64.0	21.1	3.7	12.7
D. Bojilov (1972)	18.0	64.5	17.3	0.2	12.45

Irrespective of the fact that each of the secondary sex signs dealt with has its own rhythm, and runs a somewhat independent course of development, their relation with the first menstruation is beyond any doubt. In girls with early and medium maturation, it occurs most frequently at the first and second degree of mammary glands' formation (M_1 and M_2) and pubic hairing (P_1 and P_2), and at the first, and rather rarely second degree of axillary hairing (Ax_1 and Ax_2).

Moreover, the data presented in Tables 1 and 2 demonstrate that at a certain age (13—15 yrs for boys, and 10—14 yrs for girls) the degree development of the signs is most variable. The strong individual variations are in support of the statement made by many authors that during the puberty years in a calendar age, individuals can be found exhibiting different degrees of biological development. The different terms of secondary sex signs formation has an essential practical implication, since the onset of sexual maturation is by no means accomplished by intensification of the growth processes alone. It is characterized by a peculiar motoricity, increased fatigability and excitability of the nervous system, and other peculiarities which, by the combined effect they exert, lead to a reduction of the resistance against unfavourable environmental factors, especially in case of mental and physical strain.

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О ПУБЕРТАТНОМ РАЗВИТИИ ПОДРОСТКОВ

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РЕЗЮМЕ

Обсуждаются результаты изучения пубертатного развития 2711 мальчиков и девочек из города Толбухина, в возрасте от 8 до 18 лет. Пубертатное развитие у мальчиков девочек начинается в возрасте 9 лет с увеличения внешних половых органов и обрастания волосами лобка. Обрастание волосами подмышками начинается на 1 год позже, причем в конце периода запаздывает более чем на 2 года. Обрастание волосами верхней губы и бороды начинается в 11-летнем возрасте и продолжается у 56,6% обследованных и после изучаемого возрастного периода. Пубертатное развитие девочек начинается в 8 лет с развитием молочных желез и обрастания волосами лобка. Сравнительный анализ с аналогичными исследованиями в прошлом показывает ускорение развития рассматриваемых признаков, средний возраст в появлении которых снижается за последние 40 лет на 0,7—1 год. Снижен и средний возраст менархе, в сравнении с исследованиями Ст. Ватева (1904.) на 1,8 лет, или, на 3 месяца на каждые 10 лет.