

RELATIONSHIPS BETWEEN DEVELOPEMENT OF SECONDARY SEX CHARACTERISTICS AND SOCIO-ECOLOGICAL FACTORS

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Abstract: The age at menarche in Hungarian girls was examined between 1981 and 1984. More than 32 000 data of girls were collected by status quo method. The menarche median (Me = 12.79 year) was determined by probit analysis based on 24 478 data.

The data derive from 10–15 year old girls concerning to the development stage of pubic hair, axillary hair and breast (after Tanner).

The fifty percent level of the adult stage of secondary sex characteristics was determined by scales (Schwidetzky). The basic data was valued according to the socio-ecological factors, like: number of siblings, order of birth, education and occupation of parents etc.

The details of the results from more than 16 000 girls is shown in this paper.

Key words: Pubic hair; Axillary hair; Breast; Socio-ecological factors.

Introduction

One of the most important part of one's extrauterin life is the puberty. Its beginning is marked by appearance of the development of the secondary sex characteristics. However, we have acceptable methods to study these facts (Tanner 1962) but collecting data like this cannot be carried out without problems at every population.

These problems may be caused by difficulties in social conventions for example. In Hungary we have only few data concerning the secondary sex characteristics of the youth and most of these observation based on girls' data (Jónás et al. 1968, Farkas 1969, 1986, Örley 1975, Borsos et al. 1977, Borsos 1982, Bodzsár 1983).

These things motived us to study the relationship between the development of secondary sex characteristics and the socio-ecological facts.

Material and Methods

Between 1981 and 1984 in Hungary more than 32 000 data of schoolgirls were recorded by status quo method with the help of a questionnaire. The research aimed at examining the age of menarche and its relation with the socio-ecological facts. In the course of this work body height, body weight, normal circumference of chest and bicristal breadth were measured, too (Farkas 1986). This research is also spreaded to the examination of the development stages of pubic hair, axillary hair and brest described by Tanner using point scale evaluation method. The data were converted into a 12 point scale after Schwidetzky (Grimm 1966) than they were valued by R-40 computer using the Osiris program. Our purpose was to examine the age when the development of secondary sex characteristics are the 50 percent of the full developed stages. It is equivalent of 6 point on the scale.

This research mainly refers to the 10–14 year old girls and it also considers some 7–9 year old girls. The 15 year old girls in our sample are the overaged of primary, as we didn't examine the high school girls.

We tried to classify the socio-ecological facts exactly, so for example at the occupation of parents we relied on a work dealing with classification of the occupation occurring in Hungary. In this respect we have 7 categories at fathers and 8 at mothers.

Our sample includes 6722 menstruated and 9353 non-menstruated 10–15 year old girls. These counts could be different at the certain facts because doubtful or false data were disqualified at the evaluation.

Results

The menarche median of this sample is $M_e = 12.79$ years.

Table 1 shows medians of secondary sex characteristics (further SSC) regarding the absence and presence of menstruation. The table unambiguously shows that the median of menstruated girls are lower, so the development of their SSC begins earlier then that of the non-menstruated girls. The difference is about 3 years.

Table 1. Development of SSC according to the puberty

SSC	Menstruated (M_e)	Non-menstruated (M_e)
Breasts	10.40 years	13.74 years
Pubic hair	10.50 years	13.69 years
Axillary hair	10.86 years	14.05 years

On the Table 2 the medians of SSC can be seen according to the socio-ecological factors. There are no significant differences between these medians as each categories were divided into smaller categories and these smaller groups' medians were calculated at first than we based on the means of these medians. As the number of cases are about the same at every factor, the final results are similar.

Table 2. Development of SSC according to socio-ecological factors

Socio-ecological factors	Pubes (M_e)	Axillary hair (M_e)	Breasts (M_e)
Education of mother	12.50	12.51	13.20
Education of father	12.50	12.51	12.69
Occupation of mother	12.52	12.50	12.41
Occupation of father	12.49	12.55	12.41
Size of girls' domicile	12.50	12.52	12.42
Number of living siblings	12.59	12.69	12.49
Order of birth	12.49	12.58	12.74
Last school report	12.51	12.52	12.42

But there is a more important fact that in case of medians of individual factors do not show the same change. For example: according to the education of parents or the order of birth the development of SSC is arranged as follow: breast, axillary hair and pubic hair, while regarding the occupation of mother the order is pubic hair, axillary hair and breast.

As the sample derives from the 10–15 year old girls and the development of SSC appears at earlier ages the median cannot be calculated in detailed classification. That's why we based on the average points of the SSC development at the comparison.

The *Table 3* shows the change of axillary hair development depending on the occupation of parents. It can be seen that there are no significant differences between the girls having parents with different occupation, however the appearance of axillary hair can be put to an earlier age at the girls having manual worker parents, than at the girls whose parents have intellectual jobs. It is the opposite of the occurrence of menarche.

Table 3. Development of axillary hair according to the occupation of the parents (average points, according to Schwidetzky)

Occupation of the parents	Father	Mother	Father	Mother
	menstruated girl		non-menstruated girl	
Industrial manual worker	8.41	7.91	3.89	3.67
Agricultural worker	8.57	7.85	3.74	3.91
Other manual worker	8.20	7.85	3.75	3.76
Intellectual (high educated)	8.96	8.35	4.09	4.42
Intellectual (second. educated)	8.58	8.03	4.01	4.00
Pensioner	7.48	7.53	3.30	3.69
Father/Mother died	8.04	8.76	3.97	3.74
Homemaker	—	7.17	—	3.78

The same holds in respect of the development of pubic hair (*Table 4*) and breasts (*Table 5*).

According to the parents' occupation we found a more expressed relation in the development of axillary hair: girls with lower educated parents start to develop earlier as it can be seen on the *Table 6*.

Without presenting any further tables we have the following experiences. Girls having worse school achievement have a later SSC appearance than those who have better school achievement.

We also made a survey on the development of the SSC concerning the size of settlements. Girls living in smaller populated settlements have a later SSC development than those of large places. However, in settlements with more than 100 thousands inhabitants a later appearance of the SSC were found, while in those of 50–100 thousands inhabitants it appears sooner.

In our sample all the three SSC of the first born girls begin to develop earlier than in the case of second or third born girls; but the fourth born girls have lower points than the 3rd born girls. This order is similar to the order of menarche.

Table 4. Development of pubic hair according to the occupation of the parents (average points, according to Schwidetzky)

Occupation of the parents	Father menstruated girl	Mother	Father non-menstruated girl	Mother
Industrial manual worker	8.19	7.90	4.00	3.76
Agricultural worker	8.11	7.80	3.97	3.80
Other manual worker	8.27	8.02	3.95	3.68
Intellectual (high educated)	8.28	8.06	4.28	4.06
Intellectual (second. educated)	8.33	8.03	4.26	3.94
Pensioner	7.94	8.23	4.20	4.02
Father/Mother died	8.33	8.70	4.16	3.69
Homemaker	—	7.39	—	3.76

Table 5. Development of breasts according to the occupation of the parents (average points, according to Schwidetzky)

Occupation of the parents	Father menstruated girl	Mother	Father non-menstruated girl	Mother
Industrial manual worker	8.30	7.94	4.11	3.77
Agricultural worker	8.21	7.30	4.16	3.77
Other manual worker	8.36	8.05	4.10	3.93
Intellectual (high educated)	8.22	8.13	4.39	4.26
Intellectual (second. educated)	8.36	8.04	4.39	4.07
Pensioner	7.73	8.06	4.23	4.21
Father/Mother died	8.69	8.00	4.03	3.76
Homemaker	—	7.56	—	3.77

Table 6. Development of axillary hair according to the educational level of the parents (average points, according to Schwidetzky)

Education of the parents	Father menstruated girl	Mother	Father non-menstruated girl	Mother
Without primary	7.98	8.36	3.76	3.55
Primary school	8.18	8.39	3.93	3.76
Secondary school	8.43	8.27	4.39	4.02
Vocational school	8.55	8.76	4.22	3.96
University/College	8.88	8.92	4.39	4.03

When we examine the girls regarding the number of siblings we can see that the earliest occurrence of the SSC is at those girls who have no siblings, and the more brothers or sisters they have the higher median or point we may find.

Summary

Based on the previous evaluation we can say the follows:

The development of secondary sex characteristics precedes the physiological maturation. It corresponds the well-known experiments.

According to the socio-ecological factors the changes of the SSC are the same as at menarche.

In the cases of some factors the tendency of the change of menarche is different from the changes of the development of SSC (for example at the occupation of parents).

Using status quo method in 10–15 year old girls an unambiguous connection between the development of SSC and the socio-ecological status couldn't be established. The reason of this, in our opinion, is that the development of SSC is more sensitive to the socio-ecological factors than the physiological maturation.

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