

Pubertal Development and Gonadotropic Hormone Levels in Serum of Romany (Gypsy) Girls in Slovakia

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ABSTRACT The relationships between gonadotropic hormone (FSH, LH) concentration to the chronological age and sexual maturation were investigated in Romany (Gypsy) and non-Romany girls aged 9-15 years from Slovakia. We observed a little higher FSH levels in the Romany girls in comparison with the non-Romany ones. These differences were statistically significant between the girls aged 12, 13 and 14 years. Also higher LH levels were observed in the Romany girls, but without statistical significance. The gonadotropic hormone concentrations relationship to the somatic puberty in girls were studied. In the girls the gonadotropic hormone concentrations in relation to the pubic hairiness and mamma development degree were studied. The Romany girls demonstrated a little higher FSH levels in comparison with the non-Romany ones within the mamma and pubic hairiness development degrees 2, 3 and 4. Statistically significant differences were stated in the pubic hairiness and mamma development degrees 2 and 3. LH levels of the Romany girls were higher in comparison with the non-Romany ones in the mamma and pubic hairiness development degrees 1, 2 and 5 and the differences were not statistically significant. Based on these results as well as on the world literature data the presence of the ethnic differences in the studied hormone levels could be assumed. Their cause, however, is unknown perhaps due to decreased ovarian sensitivity or some other factors. The menarche represents the phenomenon of logically reliable parameter for the sexual girl maturity. The middle menarche age in the Romany girls was 13.8 years and 13.1 years in the non-Romany ones. The Romany girls were behind the non-Romany ones by 0.7 year, i.e. approximately 8 months. Another interesting finding is represented by the fact that the Romany children were behind the non-Romany ones living in the same region in regard to the studied sexual parameter development and menarche start. This is in contrast with the general opinion regarding early Romany children sexual development.

Many factors play an important role in the development of every individual. In this case, the author is referring to the complicated relationship between endogenic and exogenic environmental factors. Therefore, great attention is given to the childhood development in clearly defined ethnic groups where genetically caused

differences and environmental factors can be studied. Such problems are contemporary and great attention is given to environmental influence, important not only for the medical community, but for society as a whole. At the present time, the Eastern Slovakian Romany population represents a relatively isolated ethnic group, providing a unique possibility to study the body growth and development of Romany children, and the interface between genetic factors and external environmental factors. The practical importance of this study is accentuated by the fact that the Romany ethnic group, while only a single element of our population, is expanding at a higher rate than other portions of Slovak society, thus increasing the importance of their biologic and somatic integration within the wider Slovakian population.

The puberty development is influenced by the whole complex of the neuroendocrinal regulations incl. CNS, hypothalamo-hypophyso-gonadal axis, secretion changes of gonadal as well as adrenal steroids et al. occur. Some of them influence the puberty development directly (e.g. FSH, LH, prolactin, gonadal hormones, suprarenal gland adrogenes and others (some indirectly) e.g., RH, IGFI, thyreoidal hormones (Goodyer, 1989).

The puberty is associated with the hypothalamo-hypophyso-gonadal axis activation, its cause being unclear to date. The gonadostatus-center located in hypothalamus is presumed. Strictly genetically coded programme as early as within the fetal period influences probably the activation onset. Some other factors – the ethnic factor, the alimentation, the whole health status, the psychology and sensibility influences, the socio-economical levels, geographical location etc. are also important. In the hypothalamus

primarily the medial - basis area where the pulse generator (oscillator) with LHRH neurons changing the neural signal into chemical LHRH one is significant. Within the recent years the gene for LHRH was found on the chromosome 8 short arm (Goodyer, 1989).

In the literature two hypothesis of puberty onset are published :

- 1/ mechanism dependent on the gonadal steroids-*i.e.* very sensitive hypothalamo-hypophyso-gonadal negative feedback system being dominant between the life years 2-3. Within this time children secrete the small quantity of FSH and LH. This hypothesis is supported by the fact even small quantity of hormones secreted by the normal prepubertal gonade is able to inhibit the secretion GT. Hypothalamo-hypophyso-gonadal axis is sensible to the gonadal steroid feedback.
- 2/ CNS inhibiting mechanism independent on the steroids embodying the inherent inhibition of LHRH pulse generator in the mediobasal hypothalamus occurring within life years 4-11. After the puberty onset the first mechanism dominates (Lisá, 1994; Ducharme, 1989).

Demographic Data of Romanies

There are no exact data about the numbers of Romany during the eighteenth and nineteenth centuries in individual countries. Though the information of their number more generations ago is lacking, we suppose that only some few hundred lived in our area. The indirect evidence confirming this estimation was given by Genčík et al. (1980) who found the extremely high congenital glaucoma frequency with the recessive autosomal hereditary type in Slovak Romanies population. The Census in 1927 states 62,000 and in the year 1893 their number was estimated only to 36,000 (Horváthová, 1964).

During the short period after the second World War, the last migration from the East occurred. Many Romany living now on the territory of the Czech Republic and Slovakia immigrated recently from Hungary and Romania.

In the Slovak Republic live approximately 400,000 Romanies (Gypsies). The highest concentration of the Romany population lives in Eastern Slovakia.

While the increase in population growth is low due to low birth rate, there has been an explosion within the Romany population. This is similar to many non-European nations in developing countries where the hygienic-epidemiological situation and nutrition have improved.

The complex approach towards Romany schoolchildren somatic growth and development study is seen in the work of Institute of Anthropology and Zoology, Faculty of Science, Košice. East Slovakia Romany children were followed anthropometrically (Bernasovský et al., 1979, 1981 ; Bernasovský and Bernasovská, 1985 a, b, their bone age was studied (Bernasovský et al., 1986) thyroidal hormones (Biroš et al., 1993) together with their seroanthropology (Bernasovský, 1994 ; Bernasovský et al., 1976, 1994 a, b). Also in the present time we study problems of Romany ethnogenesis based on DNA polymorphisms (Amp-FLPs, : Apo BII, MCT 118, YNZ 22, Col 2A 1, etc. Contract n ERB-CIPDCT 940038 PECO).

The study below is the result of long-term of research on the sexual development as well as gonadotropic hormone levels in serum of Romany and non-Romany children.

MATERIAL AND METHODS

The presented results were gained from the study of the following groups of Romany was formed by Romany and non-Romany girls from East Slovakia and the following parameters were examined. The sexual development degree was stated according Tanner (1962). The first menarche in the girls was stated by the anamnestic method. The follicular stimulating hormone (FSH) levels the luteinizing hormone (LH) levels were determined in children serum by the method according Midgley (1966). As standards for FSH International Reference Preparation of Human Pituitary FSH/LH (ICSH) for Bioassay 69/104 and for LH International Reference of Human Hormone (LH/ICSH) for Immunoassay 68/40 were used. The sexual development and the gonadotropic hormone levels of Romany and non-Romany school children we configured the children in such a manner that the interval center is the age group indication where the individuals were in the age span plus minus 6 months. The results were allocated by the binary

and unbinary t-test and the statistical significance was given in the tables by one to three crosses according the probability value (* for $P < 0.05$ and ** for $P < 0.01$).

RESULTS

The gonadotropin hormone concentration was studied in relationship to the chronological age and maturation.

Table 1 show the average values of the follicle stimulating hormone levels (FSH) in relation to the chronological of age East Slovakia Romany and non-Romany girls.

As seen, the Romany girls showed higher FSH levels. The statistically significant

in the Romany girls in the developmental stage 1, 2 and 5, but these differences were not statistically significant. During the adolescence beginning at the infantile stage up to the last pubic hairness stage FSH concentrations of the Romany girls increased twice and in non-Romany ones 2.4 times. The FSH level statistically significant increase was noted between 1 degree and all others and within the pubic hair development degree 2 and 3 in Romany girls. In the non-Romany girls these differences were stated within the degree 1 and all others, within 2 and others developmental degrees, further on within pubic hair developmental degrees 3 and 5 and within 4 and 5. LH concentrations increased 3.3

Table 1: Comparison of average values FSH (IU/l) in Romany and non-Romany girls in relation to chronological age

Age groups	Romany girls					Non-Romany girls					t
	n	Mean	SD	SEM	V (%)	n	Mean	SD	SEM	V (%)	
9	18	5.21	2.058	0.485	39.54	20	5.24	1.462	0.327	27.87	0.068
10	10	5.96	2.108	0.666	35.36	20	4.85	1.280	0.286	26.39	1.798
11	11	6.43	1.612	0.486	25.08	25	5.86	1.336	0.267	22.78	1.094
12	10	7.32	2.047	0.647	27.97	38	5.83	1.065	0.173	18.27	3.187**
13	12	8.75	2.454	0.708	28.05	48	7.19	2.276	0.328	31.65	2.089*
14	10	10.75	3.084	0.975	28.69	41	8.93	2.344	0.366	26.24	2.062*
15	6	10.25	2.734	1.116	26.67	20	10.23	4.333	0.969	42.36	0.011

differences were stated in the age categories 12,13 and 14 years. In the girls of both studied groups FSH concentration increased from 5.2 IU/l in 9 years old to 10.2 IU/l in 15 years old. LH concentrations of Romany girls manifested higher concentrations compared with the non-Romany girls. However, these differences were not statistically significant (Table 2).

LH concentrations of Romany girls increased from the value 6.3 IU/l in aged 9 year to the value 19.0 IU/l in aged 15 years. In non-Romany girls they increased from the value 5.9 IU/l to the value 15.4 IU/l (Table 2)

Table 3 illustrates the FSH and LH concentrations relation to the pubic hair development degree in the Eastern Slovakian girls. FSH and LH levels increased in girls in relation to the pubic hairness development. The Romany girls showed higher FSH levels than the non-Romany ones up to the development stage 3. Statistically significant differences were noted in the developmental degrees 2 and 3. LH levels were higher

times in the studied Romany girls from the pubic hair developmental stage 1 up to the last one, in the non-Romany girls 3 times. Significant LH level increase was noted in the Romany girls within pubic hair developmental degrees 1 and all others, within the 2 and 5 and within 3 and 5 one. In non-Romany girls statistically significant differences were found within the pubic hair developmental degrees 1 and all others and within 2 and all others.

Table 4 shows the dependencies of FSH and LH concentrations upon the mamma development degree in Eastern Slovakian girls. FSH levels were higher in Romany girls compared with non-Romany girls within the developmental stage 1, 2, 3 and 4. The differences between the girls of both groups were significant in the mamma developmental degree 2 and 3. LH concentrations were higher in Romany girls within the developmental degree 1,2,3 and 5, but these differences were not statistically significant.

During the mamma developmental last degree the Romany girls showed twice higher FSH

Table 2 : Comparison of average values of LH (IU/l) in Romany and non-Romany girls in relation to chronological age

Age groups	Romany girls					Non-Romany girls					t
	n	Mean	SD	SEM	V (%)	n	Mean	SD	SEM	V (%)	
9	18	6.28	3.602	0.849	57.38	20	5.98	3.709	0.829	61.97	0.246
10	9	7.69	4.227	1.409	54.98	20	6.89	4.916	1.049	68.09	0.437
11	11	8.45	3.189	0.962	37.72	25	10.48	4.889	0.978	46.65	1.256
12	10	12.25	3.584	1.133	29.26	38	10.39	5.108	0.828	49.16	1.078
13	12	16.39	7.196	2.077	43.90	48	15.19	11.491	1.658	75.63	0.344
14	10	18.90	6.855	2.168	49.31	41	16.35	8.070	1.260	49.34	0.869
15	6	19.00	11.260	4.597	59.27	20	15.42	8.979	2.008	58.23	0.809

Table 3 : Average values of levels FSH and LH (IU/l) in relation to pubic hairiness development degree in Romany and non-Romany girls

Degree	Romany girls					Non-Romany girls					t
	n	Mean	SD	SEM	V (%)	n	Mean	SD	SEM	V (%)	
FSH											
1	68	4.55	1.435	0.174	31.52	106	4.29	1.644	0.160	38.32	1.072
2	20	7.16	2.578	0.576	36.03	50	5.60	1.189	0.168	21.25	2.593*
3	16	9.63	3.122	0.781	32.44	42	7.18	1.995	0.308	27.79	3.546**
4	6	9.33	1.888	0.771	20.23	53	8.04	2.365	0.325	29.41	1.286
5	9	9.00	2.861	0.954	31.79	26	10.39	3.920	0.769	37.72	0.975
LH											
1	68	6.25	4.056	0.495	64.86	105	5.55	3.223	0.315	58.07	1.258
2	19	9.42	5.166	1.185	54.83	50	8.69	4.821	0.682	55.48	0.551
3	16	13.13	5.670	1.417	43.20	42	14.32	5.671	0.875	39.60	0.718
4	6	12.42	5.880	2.403	47.40	53	16.86	11.241	1.544	66.66	0.948
5	9	20.78	9.338	3.112	44.94	26	16.55	9.393	1.881	57.95	1.146

concentrations in contrast to the infantile stage, the non-Romany ones 2.7 times. Statistically significant concentration FSH increase was noted within the developmental degree 1 and all others and within the mamma developmental degree 2 and 3. In non-Romany girls these differences were significant within the mamma developmental degrees 2 and all others, 3 and all others and

within 4 and 5.

LH concentrations increased in dependence on the mamma developmental degree in the studied Romany girl group 3.5 times and in the studied non-Romany girls 2.6 times. Statistically significant LH level increase was stated within the mamma developmental degrees 1 and all others in all Romany and non-Romany girls.

Table 4 : Average values of levels FSH and LH (IU/l) in relation to mama development degree in Romany and non-Romany girls

Degree	Romany girls					Non-Romany girls					t
	n	Mean	SD	SEM	V (%)	n	Mean	SD	SEM	V (%)	
FSH											
1	72	4.56	1.502	0.177	32.96	101	4.23	1.620	0.161	38.30	1.344
2	21	7.56	2.357	0.514	31.18	60	5.77	1.412	0.182	24.47	4.178**
3	10	10.39	3.435	1.145	33.06	51	7.39	2.416	0.338	32.67	3.209**
4	9	9.06	1.845	0.615	20.37	51	8.33	2.369	0.332	28.44	0.872
5	7	9.43	2.992	1.131	31.73	14	11.32	4.195	1.121	37.06	1.060
LH											
1	71	6.22	3.992	0.477	64.18	100	5.39	3.062	0.306	56.83	1.538
2	21	9.61	4.173	0.911	43.41	60	8.92	4.449	0.574	49.85	0.622
3	10	16.30	6.516	2.060	39.97	51	16.15	10.637	1.489	65.86	0.042
4	9	13.94	5.353	1.784	38.37	51	16.15	7.929	1.110	49.10	0.798
5	7	21.71	3.871	0.242	47.17	14	14.06	10.680	2.854	75.94	1.567

The phenomenologically reliable criterion of the sexual maturity of the girls is represented by menarche.

Since we did not catch the upper limit of menarche start (school duty stops at 15 years of age), we were not able to determine the average menarche start age, therefore we calculated the middle menarche start age.

The menarche middle age of the Romany girls was 13.8 years, of the non-Romany ones 13.1 year. A delay of Romany girls was 0.7 years, i.e. approximately by 8 months

DISCUSSION

In Eastern Slovakian Romany and non-Romany puberty girls the gonadotropic hormone concentration were studied in relation to the chronological age and the maturation degree.

In accordance with other authors (Schalch et al., 1968; Raiti et al., 1969; Yen et al., 1969; Burr et al., 1970; Lee et al., 1970, 1974, 1976; Penny et al., 1970; Sizonenko et al., 1970; Winter and Faiman, 1972; Sizonenko and Paunier, 1975) we recorded the increase in the gonadotropic hormone levels in the children by chronological age. Observing the consecutive age groups the significant increase in FSH concentration in non-Romany girls a statistically significant increase in FSH concentration was stated between the age years 10 and 11, 12 and 13 and 14, also in Romany girls increase FSH concentration was observed, however, these differences were not statistically significant. In the girls Penny et al. (1970) observed the first statistically significant FSH increase at the age 8, Yen and Vicic (1970) between the age 9 and 10, Blizzard et al. (1972) between the age years 11 and 12 and McArthur (1972) between the age years 8 and 9, 9 and 10. LH concentrations were increased during the age year 9-15 in the Romany girls being statistically significant between the age years 11 and 12, in non-Romany ones between the age years 10 and 11, 12 and 13. Lee et al. (1970) recorded the statistically significant higher LH concentration between girls age years 11 and 12, Yen et al. (1969) in the girl age year 9. Similarly Penny et al. (1970) stated the significant LH level increase in the girls between their age years 9 and 10. Blizzard et al. (1972) observed the first significant increase in FSH and

LH concentrations in the American girl age 11.

FSH and LH levels in Romany and non-Romany East Slovakia girls increased in dependence on their sexual parameter development being in accordance with the data of other authors (Johanson et al., 1969; Burr et al., 1970; Lee et al., 1970, 1974, 1976; Penny et al., 1970; Sizonenko et al., 1970; Horejši et al., 1981). A more detailed comparison is interfered by the fact that the single authors applied various criteria evaluating the sexual parameter development degrees as well as by the fact that the secondary parameter evaluation is charged by the subjective error. In most cases the authors determined the maturity degree according Tanner's criteria (Tanner, 1962). Usually they noted the first significant increase in the individual sexual parameter development between their degrees 1 and 2 (Johanson et al., 1969; Burr et al., 1970; Penny et al., 1970; Lee et al., 1974). In our East Slovakia Romany and non-Romany children group the significant increase in gonadotropic hormone levels was stated within the studied sexual parameter development degrees 1 and 2.

Based on the gained results we are able to confirm a little higher gonadotropine levels in Eastern Slovakian children during the maturation as compared with the non-Romany ones living in the same region. On the average, Romany children manifested increased FSH concentration by 0.5 standard deviation and LH concentration by 0.1-0.2 standard deviation. For comparative purposes, we cite the fact Nankin et al. (1974) who noted in average by 0.5 standard deviation higher FSH levels in American Negro girls as compared with the white ones. Serum levels of gonadotropic and steroid hormones during the normal menstrual cycle of Indian women were described by Jha et al. (1978). The study has revealed that serum hormone levels of gonadotropic of Indian women were comparable to those of Western women.

Based on our results and the literature data the existence of some ethnic differences in the gonadotropine hormones can be presumed. Their cause is unknown till the present time—whether by the decreased hypothalamus sensitivity to estrogens, by the decreased ovarian sensitivity or by some other factors.

Phenomenologically reliable phenomenon of girl maturity is represented by their menarche. The age of the first menstruation is the result of

endogenic and exogenic factors relation such the heredity, the climate, the social and economic conditions the domicile etc.

As no upper limit of the menarche start was recorded (due to the school duty termination for girls aged 15 years, we were not able to state the average menarche start age based on the menstruation age. The Romany girl menarche middle age was 13.8 years, non-Romany ones 13.1 years.

Only two references about Romany girl menarche start are known in our as well as foreign literature. In the year 1974 Suchý (1978) ascertained the first menstruation start data in 31 Prague Romany girls to be 12.1 years, this means in Romany girls menarche occurred earlier in comparison with the Czech ones. The author, however, does not consider the gained results to be standard ones for the Romany girls living in Bohemia due to the small urban group. The first menstruation started for Eastern Slovakian girls were behind the Prague ones in average by 1.7 year in Romany girls and the non-Romany ones by 1 year.

At Moravian Romany girls Dokládál (1985) noted the middle menarche age to be 12.8 years being by 0.7 year higher as compared with our East Slovakia Romany girls.

If compared with East Slovakia standard (Kováč et al., 1972) the Romany girls retarded by 0.15 year in the menarche start, on the contrary, at the non-Romany girls the first menstruation occurred by 0.55 year earlier as compared with the East Slovakia girls, but by 0.3-0.4 year later as compared with the girls living in Košice and Prešov (Valšík et al., 1972; Štukovský and Valšík, 1972).

The middle menarche age of East Slovakia non-Romany girls is in accordance with the whole Slovakia average (Prokopec, 1970).

Our observations indicate that the domicile to the certain ethnic group does not influence decisively the maturation process. In our Romany girl groups the social, economical and hygienical factors came into the prominence. To ascertain the middle menarche age and maturation levels in the Romany and non-Romany children living within the same socio-economical and hygienical conditions, e.g. in the children living in care homes for children would be very interesting.

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