Features of Ultrasonic and Anthropometric Parameters among Teenage girls and Women of Yakutia

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ABSTRACT

In the study comparative characteristic of ultrasonic and anthropometric parameters in adolescent girls and women of indigenous and non - indigenous population of Yakutia was conducted. Adolescent girls and women of Russian nationality are significantly higher at comparison with the indigenous women of the RS (Y). From 10-11 years in all the girls of the Yakut and Evenki origin rapid expansion of the pelvic bones begins. Uterine size in adolescent girls of the RS (Y) indigenous population was significantly smaller at comparison with the girls of the Russian nationality.

Keywords: adolescent girls, height, weight, size of the uterus, ovaries, ultrasound investigation.

Individual human development proceeds and is changing under the influence of two major interacting factors - genetic and environmental programs. Any growing organism, owing to the incompleteness of its morphofunctional development immaturity of some of its regulatory mechanisms, high liability of a certain age group, is the most sensitive to the effects of environmental factors that can destabilize homeostasis (D.A.Farber, 2001 [6]; E.Casino, 2003 [4]; A.A.Baranov, 2006 [3]).

The influence of environmental factors on the condition of the body is not limited to the moment of their impact, but the impact itself affects further development and formation. This defines the search for optimal ways of approaching physiology of children and adolescents and those mechanisms that provide adaptive character development at each stage of ontogeny in the specific conditions of the North.

Specificity of natural, cultural and ecological conditions of the North is reflected in the physiological state voltage of functional systems and complex restructuring homeostasis (V.P. Treasurers, 1980 [5]; Avtsyn A.P., 1985 [1], with N.A. Aghajanian, 2006 [2]).

One of the most important characteristics of the health of adolescent girls is the indicators of their physical development, which are closely interrelated and interdependent with the processes of formation of the reproductive system.

Materials and methods: In order to try to find a solution for the matter mentioned above 578 women were examined, including 102 women of Russian nationality, who were in the control group, born and living in the Republic of Sakha (Yakutia). The study group included 476 indigenous women of Yakutia, including 296 and 180 of Yakut and Evenk nationalities respectively.

The control group included 50 adolescent girls and 52 women of reproductive age. 186 teenage girls and 110 women of reproductive age were Yakut. 82 teenage girls 98 women of reproductive age were Evenk.

We conducted anthropometric survey, external dimensions of the pelvis.

Ultrasonographic method of smaller hip diagnosis was done by means of an ultrasound machine called “LOKA-1700” with the use of abdominal transducer frequency of 3.5. MHz and vaginal transducer frequency of 6.5 MHz, as well as using another device – “Voluson - 730 ProV” with the following sensors: IC5-9H/GIN, RAB2-5/OB.

RESULTS AND DISCUSSION

Evaluation of the growth index showed that adolescent girls and women of Russian nationality were significantly higher comparing to the indigenous women of the Republic of Sakha (Yakutia).

Pelviometre tests revealed the increasing of external dimensions of the four bony pelvises in 10-11 year old girls; this is the age when all girls regardless of nationality begin developing rapidly in the area of the pelvic bones. The next increase of all external transverse dimensions of the pelvis was observed in the beginning of the late prepubertal period. The vast majority of 17 year old girls both Yakut and Evenk (81.2%) had lag on all the outer dimensions of the pelvis as opposed to 17 year old girls of Russian nationality. Average external dimensions of the pelvis were less than those of the Russian girls by 0.5-1.2cm, especially in relation to distantiaspinarum and conjugateexterna.

Ultrasound examination of the pelvic organs, performed in phase I and II of the menstrual cycle, (Table 1.2) showed that uterine size (length, width, anteroposterior dimension) in adolescent girls of indigenous inhabitants of the Sakha Republic (Yakutia) were significantly lower comparing to the same parameters in girls of Russian nationality. These differences were discovered on the 5-7 day of the menstrual cycle, and on 22-24 day of the menstrual cycle. Thus, the length of the uterus on 5-7 day of the menstrual cycle in the control group was 4.4 ± 0.2 cm and that of the indigenous women was significantly lower: Yakut girls - 4.0 cm and Evenk girls - 0.2, 3.8, 0.2.

There were no statistically significant differences in endometrial thickness. In all cases the endometrium was defined as M-echo regular oval, of uniform intensity. The minimum thickness of the endometrium was registered in the first days of menstruation (I phase). Maximum endometrial thickness occurred on 21-23 day of the menstrual cycle (II phase).

Evaluation of ultrasonic parameters of ovaries also revealed the fact of a statistically significant reduction of the sizes of the ovaries of girls and adolescents among indigenous women of the Republic when compared with girls of Russian nationality (Table 3). Separate study of right and left ovaries showed no significant difference in their development, which is an indication of equal participation of both ovaries in a normal menstrual cycle of girls during puberty.

There were no statistically significant differences in the size of the uterus and ovaries of women of reproductive age.

Table 1

Sonographic parameters of uterus on the 5-7 days of the menstrual cycle, cm

Groups		n	Length	Width	Anteroposterior dimension	Endometrium
Control	teenage girls	50	4,4±0,2	3,9±0,2	3,1±0,2	1,9±0,2
	women of reproductive age	52	4,9±0,7	4,4±0,3	4,3±0,9	3,4±1,2
Yakut	teenage girls	186	4,0±0,2*	3,4±0,2*	2,6±0,2*	1,8±0,2
	women of reproductive age	110	4,7±0,7	4,3±0,3	4,5±0,7	4,1±1,1
Evenk	teenage girls	82	3,8±0,2*	3,33±0,2*	2,6±0,2*	1,8±0,2
	women of reproductive age	98	4,9±0,5	4,4±0,3	4,6±0,8	3,9±1,9

Note: * $p < 0.05$ - reliability of differences established by comparison with the control group.

Table 2

Sonographic parameters of uterus on the 22-24 day of the menstrual cycle, cm

Groups		n	Length	Width	Anteroposterior dimension	Endometrium
Control	teenage girls	50	4,5±0,2	4,5±0,2	3,5±0,2	4,4±1,8
	women of reproductive age	52	4,9±0,7	4,8 ±0,5	4,4±0,9	7,4±2,2
Yakut	teenage girls	186	4,1±0,2*	3,8±0,18*	2,9±0,2*	4,1±1,2
	women of reproductive age	110	4,7±0,7	4,3±0,3	4,5±0,7	4,1±1,1
Evenk	teenage girls	82	4,1±0,2*	3,8±0,18*	2,9±0,2*	4,1±1,2
	women of reproductive age	98	4,9±0,5	4,4±0,3	4,6±0,8	3,9±1,9

Note: * $p < 0.05$ - reliability of differences established by comparison with the control group.

Table 3Sonographic parameters of ovarian on the 5-7 day of menstrual cycle, cm.

Groups		n	Right ovary			Left ovary		
			Length	Width	Thickness	Length	Width	Thickness
Control	teenage girls	50	3,3±0,3	2,5±0,3	2,0±0,2	3,3±0,3	2,7±0,3	2,0±0,2
	women of reproductive age	52	3,4±0,3	2,8±0,3	2,8±0,2	3,6±0,3	2,8±0,3	2,6±0,2
Yakut	teenage girls	186	3,0±0,1	2,0±0,1*	1,8±0,2	2,9±0,2*	2,1±0,1*	1,7±0,2
	women of reproductive age	110	3,3±0,3	2,8±0,3	2,8±0,2	3,6±0,3	2,8±0,3	2,6±0,2
Evenk	teenage girls	82	2,7±0,2	2,0±0,1*	1,8±0,2	2,8±0,2*	2,0±0,1*	1,8±0,2
	women of reproductive age	98	3,1±0,3	3,0±0,2	2,6±0,2	3,6±0,3	2,6±0,2	2,8±0,1

Note: * $p < 0.05$ - reliability of differences established by comparison with the control group.

A more detailed assessment of ultrasonic parameters of the uterus and ovaries of girls and female adolescents (Table 4, 5) showed that the growth of the uterus and ovaries occurs gradually and moderately. The girls of Russian nationality showed increase in length, width and anterior-posterior of uterine size. This was observed among girls aged 12 to 13 years of age (the length of the growth of the uterus - 1 cm, width - 1.4 cm, and anterior-posterior size - 1.1 cm). Then increase in the size dropped dramatically and ranged from 0.1 to 0.3 cm per year.

In the group of Yakut and Evenk girls the uterine length was significantly smaller when compared to that of the Russian girls. Statistically significant differences were evident among the girls of the age groups of 10-11 years old and 12-16 years of age inclusively. A similar situation is observed with respect to parameters such as the "width" and "anteroposterior dimension." 17 year old girls were noted to have a statistically significant difference and the discernible trend towards a decrease in uterine size of adolescent girls of indigenous inhabitants of the Sakha Republic (Yakutia) was registered.

Examination of the size of the ovaries of girls and adolescents showed that the significant increase in the ovarian length of Russian girls occurred between 11 and 12 years of age (the length increased by 0.6 cm), and the increase of the thickness of ovarian tissue was observed at 13 years (an increase of 0.8 cm) . Indigenous residents were observed to have an increase as well (maximum increase did not exceed 0.4 cm.)

In the group of girls Yakut and Evenk girls' ovaries were significantly smaller comparing to those of the girls of Russian nationality in the age group of under 17 year olds. For 17 year old girls a tendency of reducing sizes of the ovary was registered, but there was no statistically significant difference.

Comparison of the size of the uterus and ovaries with age at menarche showed high correlation ($r = 0,65$).

Table 4

Size of the uterus of girls and adolescents of the Republic of Sakha (Yakutia).

Group, years		Uterus, I phase			Uterus, II phase		
		Length	Width	Anteroposterior dimension	Length	Width	Anteroposterior dimension
Control	10-11	2,5±0,1	2,2±0,1	1,2±0,1	-	-	-
	12	2,8±0,1	2,7±0,1	1,9±0,1	-	-	-
	13	3,8±1,2	4,1±0,2	3,0±0,1	4,1±0,2	4,1±0,2	3,1±0,2
	14	4,1±0,1	4,2 ±0,2	3,2±0,1	4,1±0,2	4,1±0,3	3,3±0,2
	15	4,4±0,2	4,1 ±0,2	3,2±0,1	4,1±0,2	4,9±0,2	3,8±0,2
	16	4,5±0,3	3,9 ±0,2	3,0±0,1	4,4±0,2	4,5±0,2	3,5±0,2
	17	4,3±0,1	4,2 ±0,1	3,3±0,1	4,4±0,1	4,5±0,1	3,8±0,3
	18	4,4±0,1	4,3 ±0,1	3,5±0,1	4,6±0,1	4,5±0,1	4,0±0,1
Yakut	10-11	2,0±0,1*	2,0±0,1	1,2±0,1	-	-	-
	12	2,4±0,1*	2,2±0,1*	1,5±0,1	-	-	-
	13	2,8±1,2*	3,0±0,2*	1,7±0,1*	3,1±0,2	3,1±0,2	1,7±0,2
	14	3,3±0,1*	3,2±0,2*	1,9±0,1*	3,4±0,2	3,1±0,3	1,9±0,2
	15	3,7±0,2*	3,3±0,2*	2,2±0,1*	4,0±0,2	3,4±0,2	2,3±0,2
	16	4,0±0,3*	3,6 ±0,2	2,9±0,1*	4,0±0,2	3,7±0,2	2,5±0,2
	17	4,2±0,1	3,8 ±0,1	3,1±0,1*	4,4±0,1	3,8±0,1	3,3±0,3
	18	4,2±0,1	3,9 ±0,1	3,0±0,1*	4,1±0,1	3,9±0,1	3,1±0,1
Evenk	10-11	1,9±0,1*	2,0±0,1	1,2±0,1	-	-	-
	12	2,4±0,1*	2,2±0,1	1,5±0,1	-	-	-
	13	2,8±1,2*	3,0±0,2	1,7±0,1	3,1±0,2	3,1±0,2	1,7±0,2
	14	3,3±0,1*	3,2 ±0,2	1,7±0,1	3,4±0,2	3,1±0,3	1,8±0,2
	15	3,6±0,2	3,3 ±0,2	2,2±0,1	4,0±0,2	3,4±0,2	2,3±0,2
	16	4,0±0,3	3,6 ±0,2	2,8±0,1	4,0±0,2	3,7±0,2	2,5±0,2
	17	4,1±0,1	3,8 ±0,1	3,1±0,1	4,2±0,1	3,8±0,1	3,0±0,3
	18	4,2±0,1	3,8 ±0,1	3,0±0,1	4,1±0,1	3,9±0,1	3,1±0,1

Note: * $p < 0.05$ - reliability of differences established by comparison with the control group.

Table 5

Dimensions of the ovaries in girls and female adolescents of the Republic of Sakha (Yakutia)

Group, years		Uterus, I phase			Uterus, II phase		
		Length	Width	Anteroposterior dimension	Length	Width	Anteroposterior dimension
Control	10-11	2,0±0,1	1,6±0,1	1,2±0,1	-	-	-
	12	2,6±0,1	1,5±0,1	1,6±0,1	-	-	-
	13	2,7±0,2	2,4±0,2	2,4±0,1	2,7±1,2	2,4±0,2	2,4±0,1
	14	3,3±0,1	2,5 ±0,2	2,1±0,1	3,3±0,1	2,5 ±0,2	2,1±0,1
	15	3,3±0,2	2,5 ±0,2	2,0±0,1	3,3±0,2	2,5 ±0,2	2,0±0,1
	16	3,8±0,3	2,5 ±0,1	2,1±0,1	3,8±0,3	2,5 ±0,1	2,1±0,1
	17	3,4±0,1	2,8 ±0,1	2,3±0,1	3,4±0,1	2,8 ±0,1	2,3±0,1
	18	3,4±0,1	2,9 ±0,1	2,5±0,1	3,4±0,1	2,9 ±0,1	2,5±0,1
Yakut	10-11	1,7±0,1	1,5±0,1	1,2±0,1	-	-	-
	12	1,6±0,1	1,7±0,1	1,3±0,1	-	-	-
	13	2,0±0,2	1,6±0,2	1,4±0,1	2,1±0,2	1,6±0,2	1,3±0,1
	14	2,3±0,1	1,8 ±0,2	1,6±0,1	2,3±0,1	1,8 ±0,2	1,6±0,1
	15	2,7±0,2	2,0 ±0,2	1,8±0,1	2,7±0,2	2,0 ±0,2	1,7±0,1
	16	2,8±0,3	2,1 ±0,1	2,0±0,1	2,9±0,3	2,1 ±0,1	2,0±0,1
	17	3,0±0,1	2,5 ±0,1	2,0±0,1	3,0±0,1	2,3 ±0,1	2,0±0,1
	18	3,2±0,1	2,7 ±0,1	2,3±0,1	3,2±0,1	2,6 ±0,1	2,2±0,1
Evenk	10-11	1,6±0,1	1,3±0,1	1,1±0,1	-	-	-
	12	1,6±0,1	1,4±0,1	1,1±0,1	-	-	-
	13	1,9±0,2	1,6±0,2	1,4±0,1	2,0±0,2	1,6±0,2	1,3±0,1
	14	2,3±0,1	1,8 ±0,2	1,6±0,1	2,3±0,1	1,7 ±0,2	1,6±0,1
	15	2,6±0,2	2,0 ±0,2	1,7±0,1	2,7±0,2	2,0 ±0,2	1,7±0,1
	16	2,8±0,3	2,1 ±0,1	2,0±0,1	2,7±0,3	2,0 ±0,1	2,0±0,1
	17	3,1±0,1	2,4 ±0,1	2,0±0,1	2,9±0,1	2,3 ±0,1	2,0±0,1
	18	3,2±0,1	2,6 ±0,1	2,3±0,1	3,2±0,1	2,6 ±0,1	2,1±0,1

Note: * $p < 0.05$ - reliability of differences established by comparison with the control group.

CONCLUSION:

The results obtained showed that Russian adolescent girls and women of Russian nationality are significantly more developed in comparison with the indigenous women of the Republic of Sakha (Yakutia). The features of the age dynamics of the pelvic organs of adolescent girls and indigenous women of Yakutia are as follows: uterine size (length, width, anteroposterior dimension) was significantly lower comparing to the same parameters of Russian girls; increase in size of the uterus occurs gradually and moderately with leveling statistically significant difference at the age of 17; girls of Russian nationality show significant increase in the length of the ovary between 11 and 12 years of age, and increase in the thickness of the ovarian tissue was observed at the age of 13.

The native inhabitants showed a more gradual and moderate development and increase in the size of their ovarian tissue. In the course of the study it was also revealed that the regional characteristics of the physical development of the indigenous inhabitants of the Sakha Republic (Yakutia) comparing to the migrant population showed a reduction in the size of the pelvic bone from 0.5 to 1.2 cm.

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