Study on the Onset Phase of Adolescence in Southeast Yunnan

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Abstract: The physical development process in the teenage years has different performance at different ages, and the teenagers in different areas, will be different by region, diet and living habits, show certain characteristics. This article selected areas located in the southeast yunnan wenshan zhuang and miao autonomous region, 9-16 year olds in wenshan city, such as morphological indexes and body composition has carried on the widespread investigation and study, clear adolescent growth and development of wenshan city overall trend, determining the launch of wenshan city youth adolescence phase and TOA, PWV, PWA, PHV and PHA.

1 Research Object

This study with cluster sampling method to grade for the unit to extract yunnan wenshan city, the second grade primary school grade four, grade five, six and yunnan wenshan city, the second grade junior middle school grade seven and grade eight and nine 15 a total of six grade class's and grade's student, choose one born in yunnan wenshan city, health certificate, healthy, left no valid certificate was severely injured and disabled the total sample of 827 cases in each age distribution and the number of boys and girls see table 1.

Table 1. Age distribution table of research objects

Age	Boy	Girl	Total
9	41	56	97
10	76	44	110
11	61	40	111
12	72	36	108
13	36	56	92
14	66	78	144
15	26	72	98
16	26	41	67
总计	404	423	827

2 Research Methods and Contents

The questionnaire survey method was used to screen out the respondents who did not meet the requirements, and the results of the survey were recorded, as well as the organization and coordination of the experimental subjects. The morphological indicators and body components of the growth and development of teenagers in wenshan city, yunnan province were analyzed and studied by means of experiment and mathematical statistics, the growth and development rate of the

adolescents in wenshan city as a whole and its growth and development rules were summarized, and the TOA, PWV, PWA, PHV and PHA of teenagers in wenshan city were determined.

3 Results and Analysis

3.1 Peak and Peak Age of Growth Spurt of Height and Weight

The research in this paper is restricted by various factors, and it is a cross-sectional survey, so the tracking survey data cannot be used to illustrate the various peaks and peak ages of growth spurts. Therefore, the average growth of height and weight in each age group is used in the following table to study the growth spurts. Figure 1 and figure 2 can be made from the data in the table 2.

Table 2. Annual growth of height and weight of wenshan adolescents

	Growth by years			
Age	Boy weight (kg)	Girl weight (kg)	Boy height (cm)	Girl height (cm)
9～10	1.8	4.9	3.2	8.32
10～11	2.8	6.0	4.9	4.88
11～12	6.7	1.9	6.8	4.36
12～13	2.5	2.7	6.8	2.96
13～14	2.6	2.0	4.3	1.64
14～15	2.0	0.6	2.9	1.73
15～16	2.2	1.4	1.5	-1.87

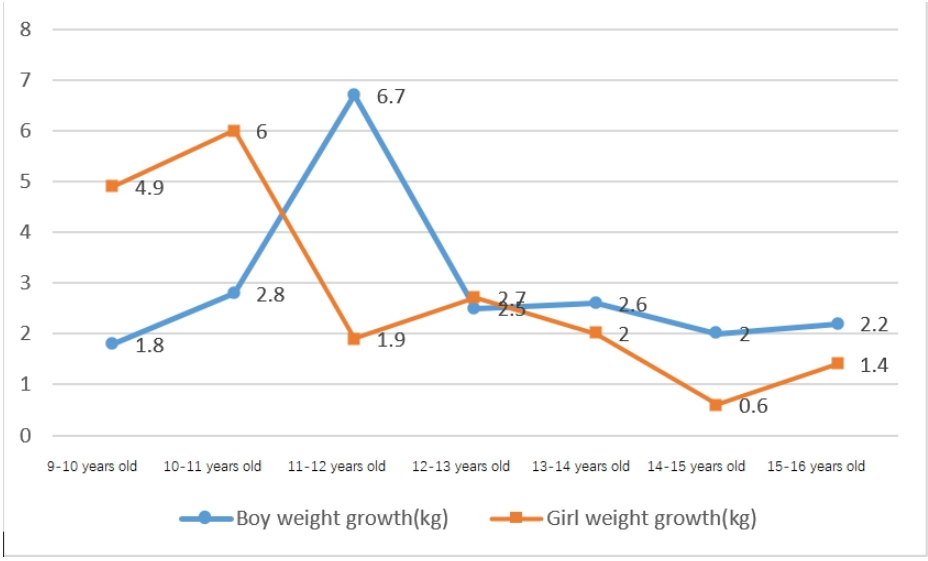

Figure 1. Annual growth of weight of wenshan adolescents

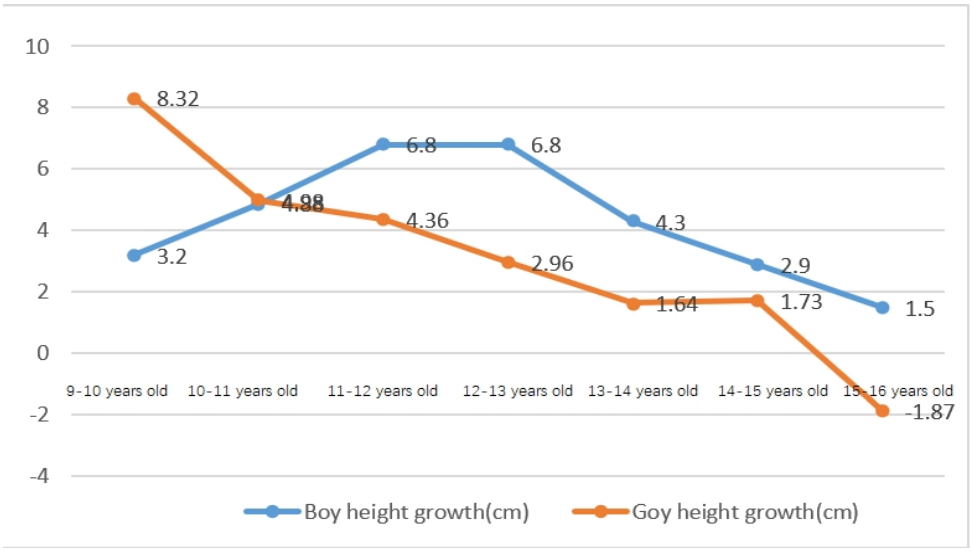

Figure 2. Annual growth of height of wenshan adolescents

By table 2 and figure 1 and figure 2, can be very clear conclusion, wenshan city teenage boy's weight and height spurt period is in 11 ~ 12 years of age, the girl's height and weight spurt period is between 9 and 10, the result is better than li-ping lu and violey research of adolescent adolescence spurt peak age a year ahead [1] [2]. The height spike was 6.8cm and the weight spike was 6.7kg. The height spike of girls was 8.32cm and the weight spike was 6.0kg. It can be inferred from this that the onset of puberty of wenshan adolescents is between 9 and 10 years for girls, while the delay of two years for boys is between 11 and 12 years for girls. The predicted age of the onset of puberty is different from the research of many scholars. Most of the research results indicate that the onset of puberty occurs between 10 and 12 years old for girls and 12 to 14 years old for boys. In this study, the onset of puberty is one year earlier [3].

3.2 Gender Differences in Growth Body Composition of Adolescents in Wenshan city, Yunnan Province

The indicators of body morphologic development are highly positively correlated with the bone mineral content and bone mineral density of the whole body, which can be inferred from the development of puberty [4]. Since overweight, obesity and body composition of female students are correlated with the onset of youth, the onset of puberty of female students can be inferred from body fat indicators [5]. Through the measurement of body composition of more than 800 teenagers aged 9 to 16 in wenshan city, the independent sample T test was conducted on the data of different indicators of boys and girls in different age groups. The results are shown in the table below.

Table 3. Comparison of skeletal muscle content and body fat percentage of boys and girls in different age groups (%)

	Skeletal muscle（$\bar{x}$±SD）		Percentage body fat（$\bar{x}$±SD）	
age	B	G	B	G
9	12.28±2.46*	11.24±2.48	23.20±10.58	20.77±8.79
10	13.06±2.14	12.89±2.4	21.19±9.42	23.71±8.85
11	13.06±2.14	12.89±2.4	21.19±9.42	23.71±8.85
12	18.21±3.43**	16.08±1.76	21.48±10.23	24.48±7.86
13	21.09±4.46**	17.12±2.36	13.98±9.65	20.64±8.39**

14	22.99±4.89**	18.76±2.31	12.90±7.11	23.32±5.46**
15	24.52±2.06**	18.78±1.89	10.18±3.79	24.43±4.89**
16	26.16±3.61**	18.72±1.99	10.76±3.62	27.16±4.87**

Note: comparison of male and female in the same age group **p<0.01, *p<0.05

Can be seen from table 3, the skeletal muscle content of wenshan city boys between the ages of 11 ~ 12 had a very big enhancement, and in the skeletal muscle content of more than 12 years old girl, and a statistical meaning, it is consistent and has just concluded a conclusion, that is the city of wenshan boy adolescence starting point is between the ages of 11 and 12, this is because the endocrine change after puberty boys bring the rapid increase of content of muscle.

By age 10, the average body fat percentage of girls had surpassed that of boys. This was probably the result of higher levels of estrogen in the body after puberty. And the percentage of body fat in girls between the ages of 13 and 16 was significantly higher than that of boys, a statistically significant difference. The statistical analysis results of other body composition indexes are shown in table 4 and table 5. These indexes are mainly fat removal weight, trunk muscle content, right upper limb muscle, right lower limb muscle and other segmental muscle analysis. These data also further confirm the above deduction of the onset time of adolescence in wenshan city.

Table 4. Comparison of fat-free body weight and trunk muscle content in different age groups between boys and girls (kg)

	fat weight（$\bar{x}$±SD）		Trunk muscle（$\bar{x}$±SD）	
AGE	B	G	B	G
9	24.18±4.03	22.58±4.18	9.95±2.43*	8.92±1.83
10	25.58±3.45	25.32±4.07	10.31±1.76	10.13±1.69
11	25.58±3.45	25.32±4.07	10.31±1.76	10.13±1.69
12	34.17±5.74**	30.88±2.95	13.89±2.69**	12.40±1.41
13	38.97±7.39**	32.51±3.96	15.93±3.07**	13.06±1.72
14	42.18±8.05**	35.23±3.86	17.51±3.64**	14.63±1.8
15	44.67±3.42**	35.23±3.14	18.77±1.82**	14.92±1.49
16	47.22±5.95**	35.07±3.36	20.37±2.89**	15.00±1.56

Note: comparison of male and female in the same age group **p<0.01, *p<0.05

Table 5. Comparison of limb muscle content and limb muscle content of boys and girls in different age groups (kg)

AGE	Right upper limb muscle（$\bar{x}$±SD）	Right leg muscle（$\bar{x}$±SD）

	B	G	B	G
9	0.90±0.39**	0.73±0.23	3.17±0.98*	2.75±0.78
10	0.92±0.25	0.88±0.22	3.30±0.72	3.29±0.74
11	0.92±0.25	0.88±0.22	3.30±0.72	3.29±0.74
12	1.41±0.40**	1.14±0.23	5.36±1.62**	4.34±0.55
13	1.74±0.46**	1.25±0.25	5.96±1.48*	5.08±1.91
14	1.98±0.58**	1.47±0.27	6.59±1.50**	5.24±0.74
15	2.18±0.28**	1.53±0.23	7.04±0.55**	5.24±0.63
16	2.45±0.46**	1.55±0.25	7.41±0.92**	5.17±0.61

Note: comparison of male and female in the same age group **p<0.01, *p<0.05

4 Suggestions

The onset of puberty of teenagers in wenshan city is between 9 and 10 years for girls, while the delay of two years for boys is between 11 and 12 years for girls. This is different from the results of some scholars, which may be due to the higher average temperature and local living habits in southeast yunnan. For health workers, the growth and development level of students in southeast yunnan should not be measured in accordance with the old national standards when conducting physical examination, but should be judged by the appropriate local evaluation standards according to the growth and development conditions in southeast yunnan.

Use of wenshan city of adolescent boys age characteristics of skeletal muscle content obviously improve as well as the girl's body fat percentage change law of development, can guide the sports workers to quickly and accurately find the part is closely related to the movement ability of physiological indexes of rapid growth, on the basis of in southeast yunnan area youth in physical education, physical exercise and provide certain theoretical basis for scientific selection.

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