Original Article

Comparison of physical growth of teenage girls with low birth weight and normal weight of Isfahan in 2016 – 2017

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Abstract:

INTRODUCTION: One of the probable risks of low birth weight (LBW) is low body growth at teenage, and most of the parents are concerned about it. This study was conducted to compare the body growth of girls at teenage in two groups.

METHODOLOGY: In this descriptive-comparative research, the body growth of 350 girls (250 students having normal birth weight (NBW) and 125 students having LBW) at the ninth grade in Isfahan, Iran, was studied. These students were chosen randomly out of 13 select schools from six districts of education in Isfahan, Iran. The data were analyzed by Independent t-test, Chi-square test, and Mann–Whitney U-test.

RESULTS: This study showed that there is a meaningful difference in weight, height, BMI, and the age of menarche. The highest weight, height, and BMI frequency (52.8 kg, 162.8 cm, and 3.31, respectively) belongs to girls having NBW compared with girls having LBW (50.6 kg, 159.3 cm and 3.36, respectively) and Independent t-test showed that weight and height average and body mass index (BMI) of girls having NBW are higher meaningfully ($P < 0.001$). In addition, the girls having NBW had reached the age of menarche at 12.36 ± 1.12 and 12.09 ± 1.01 at girls having LBW. Furthermore, there was a meaningful difference ($P < 0.001$) between the ages of menarche.

CONCLUSION: Regarding the existence, it is recommended that the children having LBW should be kept under special care. Of course, the resulted difference is not very important and concerning for the parents, but further study is needed to reach the final conclusion.

Keywords:

Body growth, girl, low birth weight

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Introduction

Low birth weight (LBW) is referred to the birth weight of 2500 g or less, which is due to prematurity or the intrauterine growth retardation, i.e., IUGR (or small gestational age [SGA]) or both.[1] Birth weight is useful in determining the future health of the children and the life expectancy factor in them.

Over 20 million low-weight infants are born every year, and the global prevalence of LBW is currently reported 15.5%, 96.5% of whom are born in the developing countries.[2] The prevalence of low weight in Iran in the year 2003 was 11.56%, and in 2007, it was 8%.[3] This rate was estimated in the city of Shahrud, Iran, in 2011 to be 7.2% for the boys and 6.1% for the girls, which showed a 7% reduction as compared to previous years due to increasing the quality of caring aspects.[4] Due to the investigations in this regard, all the studies about the increasing number of low-weight children and the threatening risks of their growth and future developments are worrying. Nowadays,

adolescents' health has been raised as an independent subject. According to definitions, adolescence indicates the range between 10 and 19 years of age. According to the records, the population of 10–19-year-old adolescents was 12.21 billion people in the world, and it is estimated that this growing trends to be continued until 2040, reaching to 1.23 billion people. According to the census in Iran in 2016, the 10–14-year-old age group formed 7.12% and the 15–19-year-old age group formed 6.83% of the whole population in the country.[5]

The milestone and quite strategic point of adolescence is the age of puberty. According to the definition of health, the maturity of physical, mental, sentimental, spiritual, and social dimensions is founded in adolescence. Rapid changes and growth in height and weight are considered as a criterion in entering the age of puberty. Thus, this point is highly considered. Parents of LBW children are usually worried about long-term complications,[6,7] not having natural growth, and the health and natural conditions of their children, in general.

It should be noted that the growth pattern is a valuable criterion in health. Thus, it is necessary that the LBW children should be regularly and precisely controlled. The growth control should be with full understanding of the previous history and the occurrence as well as the current problems of them.[8] Children's height and weight have been analyzed and compared with those in different ages, in various studies, some of which have achieved significant differences. In a research by Yousefi, children with normal birth weight (NBW) and low birth weight were analyzed in their preschool age, which showed no significant difference in their height and weight.[9] However, in a cohort study in India that the adolescents with normal and low birth weights were analyzed, significant differences were observed in their height and weight and the menarche age.[7] The findings of the study by Ibáñez *et al*. also showed precocious puberty and short height in the adolescents with LBW, as compared to the adolescents with NBW.[10] Due to lack of proper research, it seems necessary to control these children from their birth up to their adolescence. Considering the fact that there has been no study on the development of adolescents' physical growth in low-birth-weight children in Iran, this study compared the physical growth (height, weight, and body mass index [BMI]) of adolescent girls with low birth weight and normal weight city of Isfahan, Iran in 2016–2017.

Methodology

The current research was a descriptive-comparative study that was done during 2016–2017. Two groups of adolescent girls with NBW and low birth weight, who had the required conditions, participated in this study.

The inclusion criteria to the study were having 14 years of age, not having congenital disorders, or according to their parents, having Iranian nationality.

Initially, each of the six districts of the education organization in the city of Isfahan, Iran, was considered, and with regard to the different numbers of the schools in each district, two schools from District #1 of educational organization, three schools from District #2, four schools from District #3, three schools from District #4, two schools from District #5, and one school from District #6 were randomly selected. Then, by going to the selected schools, the LBW students were identified after controlling their vaccination cards by their birth, and in case, they had the required conditions and they were included in the study. Furthermore, to select the adolescents with NBW, two students were selected by the random numbers table from each school through the list of the ninth grade students, relative to each of the adolescents with low birth weight, and the total of 375 students (250 with NBW and 125 LBW students with the birth weights of lower than 2500 g) were included in the study.

The tools for collecting the data in this study were a questionnaire regarding demographic information (birth weight and height registered in the vaccination cards in the health files of the students, precise birth date, occupation and education of the parents, and the menarche age) and a weight and standing height scale which was calibrated before each measurement.

The height and weight measurements of the students were administered and recorded by the researcher with fixed instruments. Analysis of the data was done by the statistical software "SPSS version 22" (SPSS Inc., Chicago, IL, USA) and the statistical independent *t*-test as well as Chi-square and Mann–Whitney tests. $P < 0.05$ was considered statistically significant.

Results

Chi-square and Mann–Whitney tests showed that there were no significant differences in the demographic information, including the frequency distribution of the parents' occupation and education between the two groups of girls with normal and low birth weights ($P > 0.0\,01$). Most of the fathers were self-employed, and the highest frequency was 64% in the group of LBW girls, while it was 66.4% in the group of girls with NBW. Furthermore, most of the mothers were housewives, and the highest related rates of frequency for it were 74.4% and 75.6% in the group of LBW girls and the group of girls with NBW, respectively. The highest rate of frequency for the education indicated fathers to have under high school education and mothers with high

school education that was 43.2% in the group with NBW for under high school education and 48.8% for the high school education, while for the group with low birth weight, 39.2% had under high school education and 46% had high school education.

Moreover, the required evaluation was done on the height and weight by the birth and the pregnancy age in the females with NBW and low birth weight, the mean and standard deviation of which are separately stated in Table 1. It is to note that the main criterion of the study was the birth weight and not the pregnancy age, but no significant differences were observed in the fulfilled analyses between the two groups on the variable regarding the pregnancy age.

The independent *t*-test showed that the average weight, height, and BMI in the adolescent girls with NBW were significantly more than in the group of adolescent girls with low birth weight ($P < 0.001$), and the mean of BMI had a significant difference between the two groups ($P < 0.001$). The highest frequency for the weight was related to the adolescents with the NBW (52.8 kg) relative to that of the LBW adolescents (50.6 kg), and furthermore, the highest frequency for the height was related to the adolescents with the NBW (162.8 cm) relative to that of the LBW adolescents (159.3 cm). It is to note that according to the fulfilled analyses, the weight and height indices of the adolescents with low birth weight and NBW relative to their ages were in the healthy range. The mean of the BMI in the adolescents with NBW was 3.31 and in the adolescents with the low birth weight was 3.66. Furthermore, a significant difference was observed in the average menarche age in the two groups of girls, indicating reaching menarche at the age of 12.36 ± 1.12 for the girls with NBW and the

age of 12.09 ± 1.01 for the girls with low birth weight [Table 2].

Discussion

Results showed that there were no significant differences between the demographic information including height and weight at birth, frequency distribution of the parents' occupation, and education between the two groups of girls with normal and low birth weights, which were predictable due to random allocation of the group of adolescents with NBW, and hence, it approves the sampling method.

Findings in this study showed that there were significant differences between the weight, height, and BMI of the adolescents with NBW and the ones with low birth weight. In a futuristic cohort study in India with the subject of analyzing the growth of LBW children up to their adulthood, dealing with the measurements of height, weight, head circumference, obesity, and blood pressure of 161 born infants up to 18 years of age, the results showed that the preterm SGA boys had shorter heights as compared to a control group ($P = 0.02$), but there was no difference in the weights of the two groups.[9] Similar results were obtained in another study that has investigated 20 years of age of the LBW children.[7] In an older cohort study in India that was done on 252 LBW children and followed the investigations on the children up to the age of 14 for their growth, the results showed that the height, weight, and head circumference of LBW boys were significantly lower than the control group, and the LBW girls also had significant differences with the control group in that regard.[11] In the obtained results for the preschool ages, no significant differences were observed in the study by Yousefi F (2014) in the height and weight of these children with low and NBWs ($P < 0.001$).[12] Significant differences were shown in the current study between the weight and height (2.6 cm) of the two considered groups. With the special care of the children, their parents can be assured that the LBW adolescents would go through the critical age of puberty similar to other adolescents, and the hormonal changes in that period would have almost similar effects on them as compared to the adolescents with the NBW.

Table 1: Average and standard deviation of weight, height at birth, and the pregnancy age in females with normal birth weight and low birth weight

Indicators	SD±average	
	Girls with low birth weights	Girls with normal weights
Weight at birth (kg)	260.82±2228.64	369.24±3259.79
Height at birth (cm)	2.15±49.52	2.01±50.53
Pregnancy age in the female (week)	1.26±35.80	1.92±38.79

SD=Standard deviation

Table 2: Physical growth and menarche age

Indicators	SD±average		Independent *t*-test	
	Girls with low birth weights	Girls with normal weights	*P*	*T*
Weight (kg)	50.6±10.4	52.8±9.2	0.04	2.07
Height (cm)	159.3±5.6	162.8±6.7	<0.001	4.95
BMI	19.90±3.66	19.94±3.31	0.04	0.11
Menarche age (year)	12.09±1.01	12.36±1.12	0.02	2.43

BMI=Body mass index, SD=Standard deviation

Independent *t*-test showed that the average menarche age in the group of adolescent girls with NBW is significantly more than the group with low birth weight ($P < 0.001$). The average menarche age in the girls with NBW was obtained to be 12.36 ± 1.12 while that in the girls with low birth weight was the age of 12.09 ± 1.01 years.

The results of a cohort study in India on 252 LBW girls up to the age of 14 regarding puberty showed that breast growth occurs earlier in the LBW adolescents. Menarche happens by the age of 13.6 in the control group, while it happens 6 months earlier in the preterm children. The duration of the peak of growing height in the menarche age is shorter in the LBW adolescents.[11]

The findings of the study by Ibáñez *et al.* that was done on 54 adolescents with normal and low birth weights in Spain about precocious puberty showed that the predicting features of precocious puberty were similar for the group with NBW and LBW. However, menarche happens 1.6 years on average in the group with LBW as compared to the other group, and regarding their height, LBW adolescents are about 5 cm shorter than the ones with NBW.[10]

Conclusion

The findings of this study showed that although the weight and height of the two studied groups were in the healthy range, the average weight, height, and BMI in the adolescent girls with NBW were significantly more than those with the low birth weight. Thus, regarding the importance of LBW children for the families and their consultation and guidance requests about the puberty changes, it would be better for these children to be under special care until the end of their physical growth. Furthermore, the findings of this study showed that the average menarche age in the LBW girls had a significant difference with the ones with NBW. However, for the final conclusion in these cases, and due to the multifactorial nature, more research is needed in different communities. Planned or unplanned and the time of birth of these adolescents in the family is also one of the factors that can be considered in future studies. The effect of low birth weight on education and social behaviors and physical illnesses is one of the suggestions that can be made in the future.

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Conflicts of interest

The authors declare that they have no competing interests.

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