



Relationship Between Timing Of Peak Height And Weight Velocity In West Bengal School Children Aged 6-17 Years

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ABSTRACT

Growth velocity charts are important to evaluate the growth of a subject and available for height & weight, in both boys and girls. Height or weight velocity is a variable derived from the measurement of height or weight at different times and represents the increase in height or weight during a fixed period. Height or weight velocity charts depict the age dependent changes in velocity that characterize human postnatal growth. The aim of the study was to assess the peak height and weight velocity in respect to age (6-17 years) of West Bengal School Children in India. 600 healthy school students (300 boys and 300 girls) aged 6-17 years from class I to XII in Srinanda High School of Bolpur, Birbhum District, West Bengal, India were assessed. Each student body height and body weight were measured by standard procedure. Peak height and weight velocity were calculated by using excel programme in the computer and also to compare these data with World Health Organization (WHO) standard. Peak Height Velocity (PHV) and Peak Weight Velocity (PWV) was reached 13-14 years in boys & 11-12 years in girls. Peak Height and Weight Velocity were found in higher age comparing to other developed countries. The study presents normal height and weight velocity in West Bengal School Children. A secular trend was observed in achieving peak height velocity and peak weight velocity in both boys & girls.

Introduction

The accurate assessment of the physical growth and development of children has attracted much attention to the health care providers and paediatricians. Growth rates of height and

weight of children and adolescents are considered to be the best available dynamic indicators of nutritional and health status of any given population (Lee et al. 2004). Age at maximum growth in a body dimension

provides important information about the timing of adolescent growth in general and the individuality of physical growth (Shuttleworth 1939, Tanner 1962, Malina and Bouchard 1991). Many investigators have reported peak velocities, ages at peak velocity and relationships among ages for several dimensions of adolescent growth. (Roche 1974, Tanner et al. 1976, Lindgren 1978, Cameron et al. 1982, Gasser et al. 1985, Satake et al. 1988, Satake, Kikuta and Ozaki 1989). It is well known that onset of the adolescent growth spurt in girls occurs earlier and continues for a shorter duration, than in boys (Boothby and Sandeford 1929, Topper and Muller 1932, Shock 1946, Dakshayani and Ramanamurthy et al. 1962, De and Nagchaudhri 1975). Carron and Bailey (1974) utilized two somatic characteristics as a maturity indicator, 'age at peak height velocity' and 'age at peak weight velocity'. With the spurt, growth rate increases, reaching a peak (peak height velocity, PHV) at about 12 years in girls and 14 years in boys (Tanner 1962, 1978, Malina et al 2004). Chavalittamrong et al. (2007) reported that the peak height velocity in girls was 11 years 7 months and in boys 13 years 6 months, where as peak weight velocity in girls 12 years and in boys was 14 years of age. Although there have been a considerable number of studies of the growth of Indian children over the last 20 years, few have been longitudinal in nature and very few had covered the age range period from early infancy to adulthood (Hauspie et al. 1980). However, the purpose of this present study, an attempt has

been made to examine the trend of growth in height and weight among West Bengal School Children & also to compare these data with World Health Organization (WHO) standards in order to find out their physical growth status.

Methods

Six hundred healthy school children data (300 boys and 300 girls) aged between 6-17 years from class I to XII, Srinanda High School, Birbhum District, West Bengal State, India were collected. From each class (I to XII) twenty-five boys and twenty five girls data were randomly collected. Body weight and height were measured three times by standard instruments and average were taken. Then separately average was calculated for each class. Peak Height Velocity (PHV) and Peak Weight Velocity (PWV) were plotted through the excel software programme.

Results

The result of the anthropometric measurement of peak height and weight velocity in the different age groups of West Bengal School Children depicted in the following Figures and Tables. For Boys, Present study and WHO standard peak height and weight velocity was reached in the age of 13-14 years (Figure and Table No.-1 & I, 2 & II). Whereas in girls, Peak height velocity was reached in 11-12 years in West Bengal School Children and 7 in WHO standards (Figure and Table No.- 3 & III). On the other hand, for girls, peak weight velocity was reached in 11 -12 years in West Bengal School Children and 10-11 years in WHO Standards (Figure and Table No.- 4 & IV).

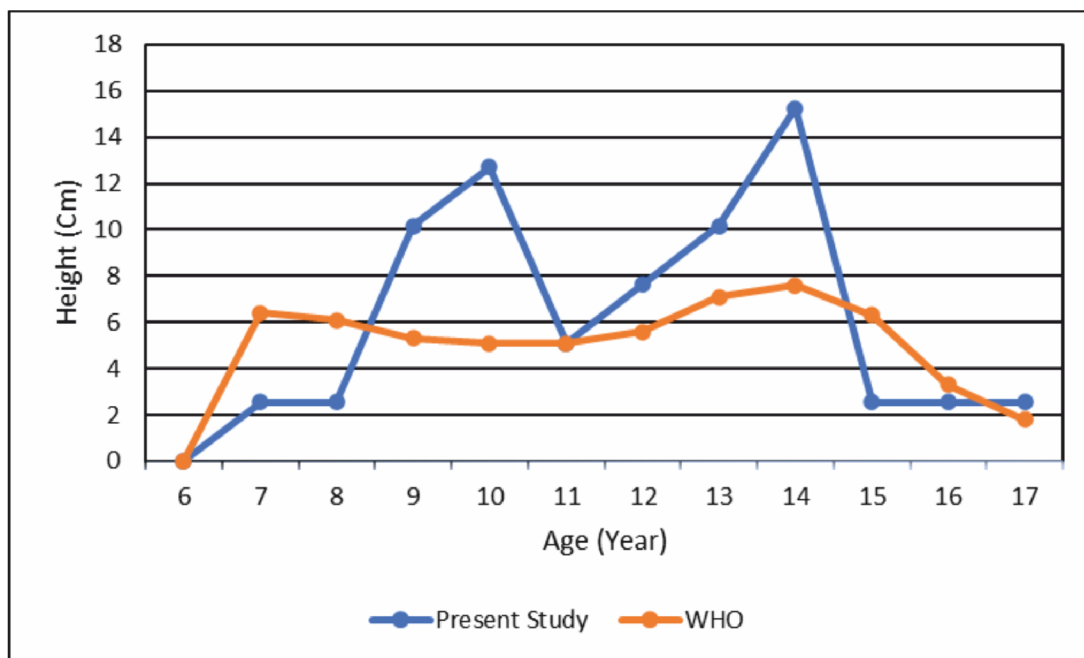


Figure-1: Peak Height Velocity (PHV) for Boys

Table-I: Peak Height Velocity (PHV) for Boys

Age (Year)	Present Study Boys Height (cm)	Present Study Boys PHV Curve	WHO* Boys Height (cm)	WHO* Boys PHV Curve
6	104.14	0	115.50	0
7	106.68	2.54	121.90	6.40
8	109.22	2.54	128.00	6.10
9	119.38	10.16	133.30	5.30
10	132.08	12.70	138.40	5.10
11	137.16	5.08	143.50	5.10
12	144.78	7.62	149.10	5.60
13	154.94	10.16	156.20	7.10
14	170.18	15.24	163.80	7.60
15	172.72	2.54	170.10	6.30
16	175.26	2.54	173.40	3.30
17	177.80	2.54	175.20	1.80

[*Source: Information and data for above growth charts sourced from the World Health Organization(WHO),Gerontology Research Centre, National Institutes ofHealth {(NIH), USA} and the U.S. Centres for Disease Control and Prevention (CDC)].

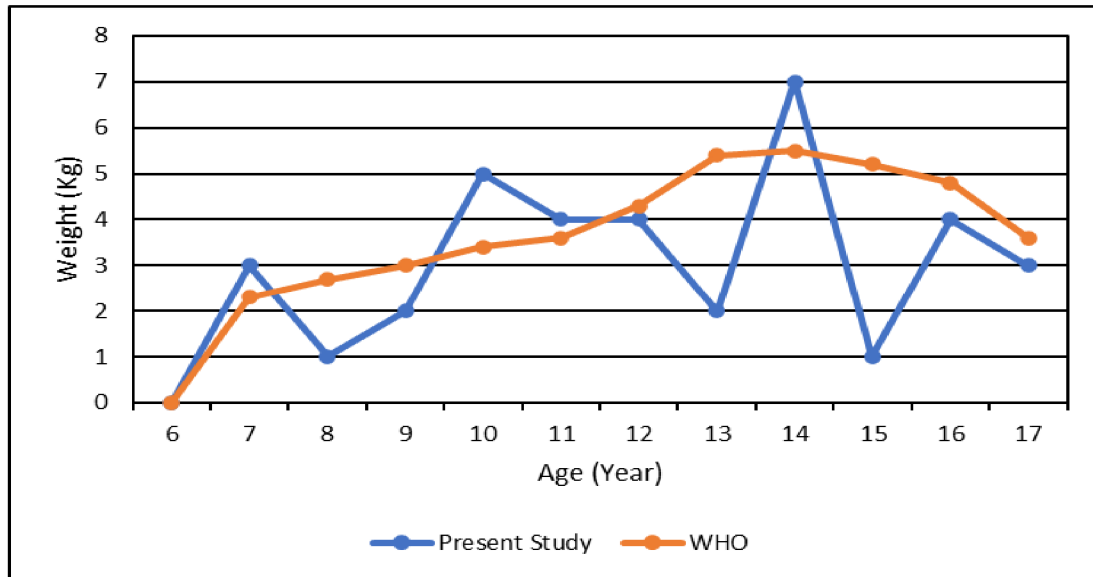


Figure-2: Peak Weight Velocity (PWV) for Boys

Table-II: Peak Weight Velocity (PWV) for Boys

Age (Year)	Present Study Boys Weight (kg)	Present Study Boys PWV Curve	WHO* Boys Weight (kg)	WHO* Boys PWV Curve
6	16	0	20.60	0
7	19	3	22.90	2.30
8	20	1	25.60	2.70
9	22	2	28.60	3.00
10	27	5	32.00	3.40
11	31	4	35.60	3.60
12	35	4	39.90	4.30
13	37	2	45.30	5.40
14	44	7	50.80	5.50
15	45	1	56.00	5.20
16	49	4	60.80	4.80
17	52	3	64.40	3.60

[*Source: Information and data for above growth charts sourced from the World Health Organization(WHO),Gerontology Research Centre, National Institutes ofHealth {(NIH), USA} and the U.S. Centres for Disease Control and Prevention (CDC)].

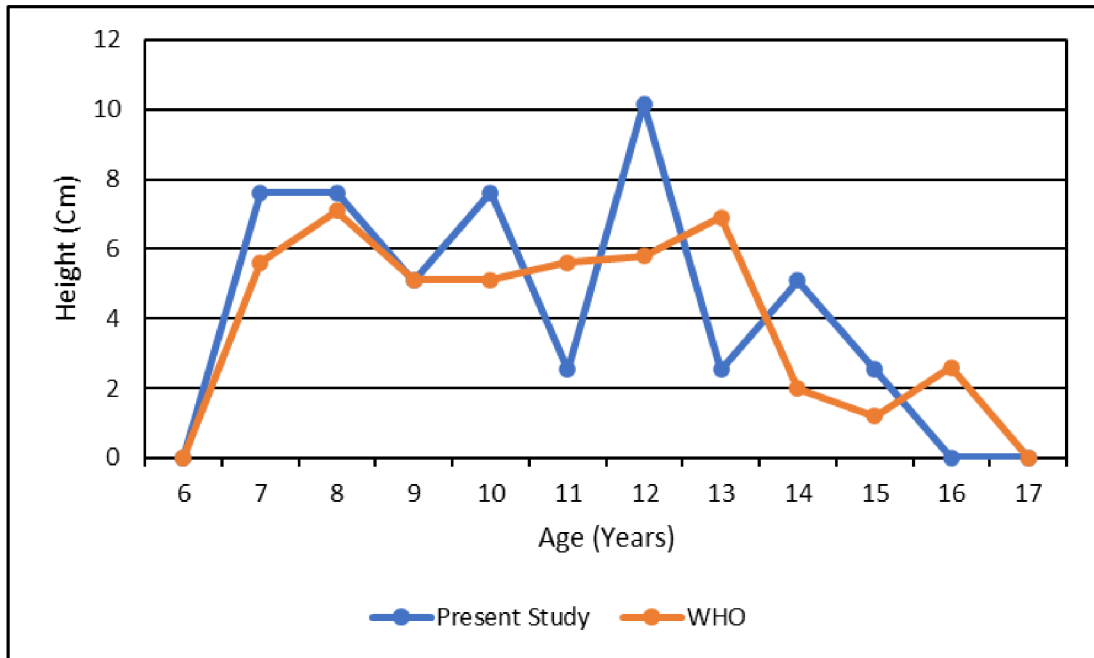


Figure-3: Peak Height Velocity (PHV) for Girls

Table-III: Peak Height Velocity (PHV) for Girls

Age (Year)	Present Study Girls Height (cm)	Present Study Girls PHV Curve	WHO* Girls Height (cm)	WHO* Girls PHV Curve
6	104.14	0	115.50	0
7	111.76	7.62	121.10	5.6
8	119.38	7.62	128.20	7.10
9	124.46	5.08	133.30	5.10
10	132.08	7.62	138.40	5.10
11	134.62	2.54	144.00	5.60
12	144.78	10.16	149.80	5.80
13	147.32	2.54	156.70	6.90
14	152.40	5.08	158.70	2.00
15	154.94	2.54	159.90	1.20
16	154.94	00	162.50	2.60
17	154.94	00	162.50	00

[*Source: Information and data for above growth charts sourced from the World Health Organization(WHO), Gerontology Research Centre, National Institutes of Health {(NIH), USA} and the U.S. Centres for Disease Control and Prevention (CDC)].

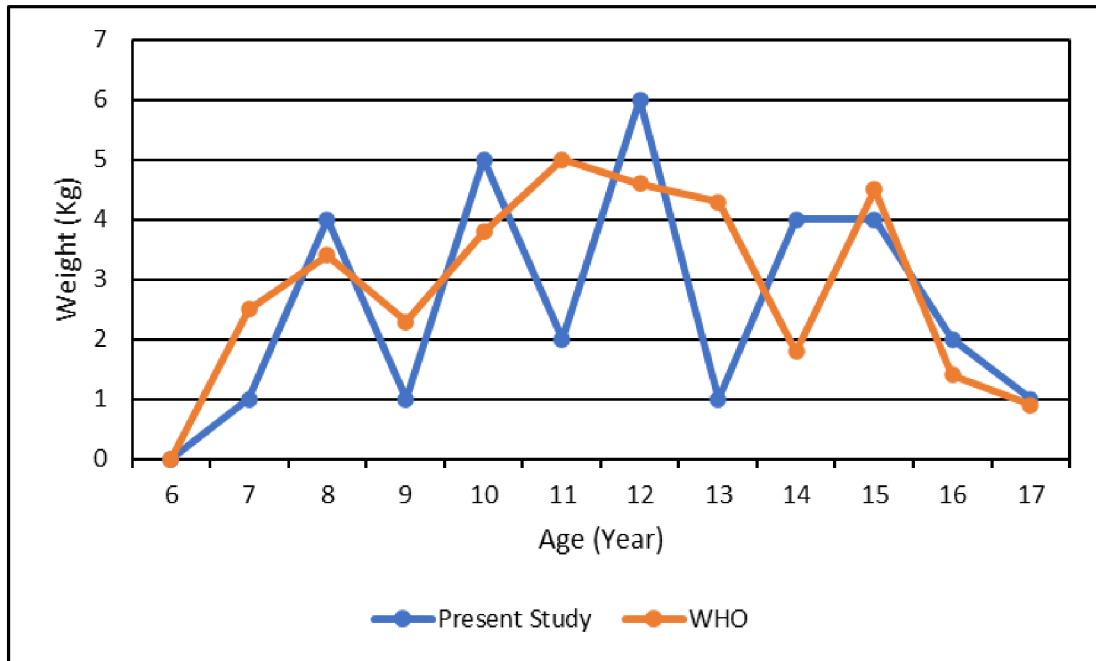


Figure-4: Peak Weight Velocity (PWV) for Girls

Table-IV: Peak Weight Velocity (PWV) for Girls

Age (Year)	Present Study Girls Weight (kg)	Present Study Girls PWV Curve	WHO* Girls Weight (kg)	WHO* Girls PWV Curve
6	16	0	19.90	0
7	17	1	22.40	2.50
8	21	4	25.80	3.40
9	22	1	28.10	2.30
10	27	5	31.90	3.80
11	29	2	36.90	5.00
12	35	6	41.50	4.60
13	36	1	45.80	4.30
14	40	4	47.60	1.80
15	44	4	52.10	4.50
16	46	2	53.50	1.40
17	47	1	54.40	0.90

[*Source: Information and data for above growth charts sourced from the World Health Organization(WHO), Gerontology Research Centre, National Institutes of Health {(NIH), USA} and the U.S. Centres for Disease Control and Prevention (CDC)].

Discussion

Hauspie et al. (1980) observed that the adolescent growth spurt in the Indian similar to that seen in the British children, as is the age at which it occur (peak height at 14.0 years in boys, 12.5 years in girls). Satake et al. (1993) reported that ages at which peak height & weight velocity occurred, on average, earlier in Japanese (boys 12.6 — 13.4 years and girls 10.8 — 11.5 years) than in European and North American children. Chavalittamrong et al. (2007) reported that the age of peak height velocity was earlier than the peak weight velocity in both boys and girls in Bangkok school children.

Sharma (1970) reported that peak height velocity in Maharashtrians (India) Children, 14.0 years in boys and about 11.0 years in girls. Seth et al. (1972) reported that peak height velocity is around 12.5 years of age in girls in the State of New Delhi. Kaul et al. (1976) observed that peak height velocity in Madhya Pradesh (India) children 14.0 years in boys and 11.5 years in girls. Dabas et al. (2018) reported that Peak Height Velocity (PHV) at 12-12.9 years for boys and 10-10.9 years for girls in North Indian School Children.

It is only after puberty that children from US and Europe go on to become taller as adults. This reflects accurately the observation made by Gopalan (1989) between American subjects and two Asian groups (Japanese and affluent Indian). Having observed that pre-adolescent children in India have similar growth and

stature as those from America and Europe, Gopalan then goes on to ask whether the difference in height gains during adolescence between US subjects and Indians reflected a true genetic difference or whether it was explainable on the basis that the secular trend in the growth of children in developing countries, even among the affluent sections, has not yet reached the plateau stage of completion (Virani 2005).

Genetic factors set a ceiling on growth but become effective only when nutritional and other factors have reached an optimal level (Dugdale et al. 1970). Children with backgrounds of under nutrition start by being shorter during their pre-pubertal phase, but then have normal growth intensities during puberty and a longer growth period resulting in a greater increment in height during puberty (Satyanarayana et al. 1989). Eveleth and Tanner (1990) observed that in India, as far as child growth is concerned, dissimilarities are brought about mainly by socio-economic differences rather than ethnic variation. Other scientist concluded that children from different regions of India have similar growth characteristics when brought up within the same environment (Chatterjee and Mandal, 1994).

Conclusions

Normal Growth velocity curves are important in the paediatric field for assessing growth of healthy children and children with growth retardation associated with different aetiologies. Their use is complementary to the

use of height and weight curves to obtain all information regarding the growth of a child. The study reports peak height & weight velocity of apparently healthy school children in the age group of 6-17 years from West Bengal, India. The Peak Height Velocity (PHV) & Peak Weight Velocity (PWV) a secular trend with boys achieving at 13-14 years and girls at 11-12 years.

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