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7. Secular Changes In Height And Weight Among The Rabha Children Of Kamrup District, Assam

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Abstract

Children are a critical resource whose growth and wellbeing will determine to a large extent the course of a country's social and economic future. Therefore, appraisal of the progress of a country in the field of health can be made from time to time with the help of growth studies. The term 'secular trend' is used to describe marked changes in growth and development of successive generations of human populations living in the same territories. We do not know the evidence of secular change in growth in any tribal population in North-East India. A study on the secular change on any tribal population will help us to understand whether the trend of such change is same for both the caste and the tribal children. Present study is an attempt to examine the secular changes in height and weight among the Rabha children of Kamrup district, Assam. The anthropometric data for the present study on growth pattern have been collected from 1643 Rabha children (819 boys, 824 girls aged 3 to 18 years of different villages of Kamrup District, Assam. The lesser gain in height and the much lesser gain in weight during the last forty years might lead to the more or less the similar height and weight of the Rabha at present despite the Rabha having taller stature and clearly heavier weight in 1978.

Key Words: *Physical growth. Height and weight. Secular change. Rabha. Kamrup. Assam*

Introduction

The growth and development of human physique is considered an important area of research as it provides determinants of Nation's health. By the term growth we mean a regular process of quantitative increase in size or mass of different tissues and organs of the body especially from conception to adulthood (Bogin, 1991). Growth and development of children concern with physical growth, mental and social development and personality of a child. Many studies indicate that the pattern of physical growth and development, though genetically determined, is strongly influenced by socio-economic and nutritional status (Saheb and Prasad, 2009). According to Tanner (1988), "The

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study of growth is important in elucidating the mechanism of evolution for the evolution of morphological characters necessarily comes about through alteration in the inherited pattern of growth and development. Growth also occupies an important place in the study of individual differences in form and function of man, for many of these also arise through differential rates of growth of particular parts of the body relative to others".

Children are a critical resource whose growth and wellbeing will determine to a large extent the course of a country's social and economic future. Therefore, appraisal of the progress of a country in the field of health can be made from time to time with the help of growth studies. According to de Onis (2003) growth assessment is the single measurement that best defines the health and nutritional status of children, just as it provides an indirect measurement of the quality of life of an entire population. The future of human societies relies on children being able to achieve their optimal physical growth and development (Jaswal et al. 2001).

"Growth is referred to as mirror of the condition of a society", (Tanner 1963). The growth of children among various groups, which make up a contemporary society, reflects rather accurately the material and moral condition of that society. Again as per Tanner (1967), growth is one of the best indices of child health and a continuous monitoring of the growth and development of children in under and over nourished population, is or should be a major concern of all public health authorities and government.

The term 'secular trend' is used to describe marked changes in growth and development of successive generations of human populations living in the same territories. This has been predominantly documented in European and European-origin populations during the last 100-200 years. In a number of groups, average heights and weights have been shown to be greater with each generation, while the onset of puberty, especially the adolescent growth spurt and menarche have been taking place at progressively younger ages. Most evidence adduced for the presence of secular trend involves measures of height and/or weight. Secular changes have been demonstrated in physical characteristics of newborn babies, growing children, and adults. Under improved environmental conditions, the mean birth weight, head breadth and circumference of newborn babies all tend to increase. Growth studies in the North-East mainly center around the individual and collective efforts of interested and

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specialized scholars. The findings of these studies either are in the form of doctoral reports or published as research papers and projects. The various studies on growth and development in the North East shows that the tribal groups show better growth and lower level of under nutrition than the caste population. The reason for which is not clearly explained. Moreover, the trend of secular change among the Kalita children could be observed in the study of Choudhury and Bhuyan (1994). But we do not know the evidence of secular change in growth in any tribal population. A study on the secular change on any tribal population will help us to understand whether the trend of such change is same for both the caste and the tribal children. The Rabha children of the Kamrup district was studied by Choudhury (1979). Present study is an attempt to examine the secular changes in height and weight among the Rabha children of Kamrup district, Assam.

Material And Methods

The anthropometric data for the present study on growth pattern have been collected from 1643 Rabha children (819 boys, 824 girls aged 3 to 18 years. The data on the Pati Rabhas have been collected from the villages of Sokabaha, Bakrapara, Nalapara, Lampara, Khatkhati, Xakhati, Kholihakoth of Boko, Dhoopdhara and Singra areas of Kamrup District.

The sample has been distributed into sixteen different age groups at an interval of one year. In the present study cross-sectional method has been used in collecting data. All the standard techniques of measurements described by Weiner and Lourie (1969) and Singh and Bhasin (2006) were followed for taking the Measurements on height and weight of the subjects. Estimation of correct age is an essential factor in any growth study. In the present study extreme care was taken in collecting the exact date of birth.

The age was collected from the birth records and school records which have been well maintained. The whole data of the two communities have been grouped from 3 to 18 years of age. It has been arranged into sixteen different age groups. The age groupings from 3 to 18 years are at one year interval. The children who have completed 3 years but were less than 4 years have been represented by the age group of 3+. Likewise children who have completed 4 years but are less than 5 years were included in the age group of 4+ years and so on.

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Age group in years	Rabha	
	Boys	Girls
3+	48	46
4+	50	54
5+	52	50
6+	54	56
7+	53	56
8+	56	52
9+	53	50
10+	54	52
11+	54	56
12+	52	50
13+	50	52
14+	50	55
15+	50	54
16+	52	50
17+	49	46
18+	42	45
Total	819	824

The Pati Rabhas of Kamrup District are inhabitants of the plain areas and they are surrounded by the caste populations. They have not preserved their Tibeto Burman dialect and have been speaking Assamese language since a long time. The system of cross cousin or parallel cousin marriage is not prevalent among them. As a result of their long contact with the neighbouring caste Hindus, they have embedded some elements of Hindu culture (Mazumdar 1972). The economy of the Rabhas mainly centers round wet rice cultivation. Only a few of them had other occupations. The data on Pati Rabhas for the present study have been collected from the villages of Sokabaha, Bakrapara, Nalapara, Lampara, Khatkhati, Hahim, Xakhat Kholihakoth, Singra of Boko area of Kamrup district. These villages fall under Boko and Bekeli Mouza under Boko Block.

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Results

There is a continuous upward trend of stature in both the sexes, indicating an increase in the mean values (Tables 1 & 2; Fig. 1 & 2). But this increase is not uniform across all the age groups. In the early age groups from 3 to 8 years of age the Rabha boys are taller than the girls. Thereafter from the age of 9 years the Rabha girls supersede the boys and continue to remain taller than the boys till 12 years of age. But again the boys take over the girls from 13 years of age onwards. The highest increase of 9.13cm in the mean value among the boys is at 3 to 4 years followed by 7.92 cm between 11- 12 years. While in case of girls the highest increase in mean value is in the age group of 10 and 11 years (9.03cm) followed by 8.05 cm between 3 and 4 years of age. After the age of 12 years there is a gradual decline in the mean value of the stature of the boys. While in case of girls the same happens from the age of 11 years onwards.

The velocity curve of the Rabha boys shows a number of peaks between the ages of 5 and 6 years, 7 and 8 years after which there is a decline. The highest peak of 7.92 cm is found between the ages of 11 and 12 years. In case of Rabha girls there are two peaks between the ages of 5 and 6 years and 8 and 9 years. After which the highest peak of 9.03 cm is found between the ages of 10 and 11 years. After the highest peak in boys there are three peaks between the ages of 12 and 13 years, 14 and 15 years and 16 and 17 years. In case of girls there is a gradual decline after the highest peak (Tables 1 & 2; Fig. 1 & 2).

From the growth gradient it is seen that the girls are more mature in the attainment of the full size of their stature than the boys. The girls have attained 59.92% of their mature size at the age of 3 years while the boys have attained 56% of their mature size at the age of 3 years. In boys 43.88% growth takes place between the ages of 3 to 18 years whereas in girls 40.07 % growth takes place from the ages of 3 to 18 years (Tables 1&2).

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Table 1: Statistical constants of Stature in cm of Rabha Boys

Age (years)	No.	Mean±SE	SD±SE	CV±SE	Abs.Grw	Gr%per annum	Grow Grad.
		Stature					
3+	48	92.4±0.65	4.51±0.46	4.88±0.5			56
4+	50	101.53±0.56	3.99±0.4	3.93±0.39	9.13	9.88	61.53
5+	52	106.59±0.73	5.23±0.51	4.91±0.48	5.06	4.98	64.6
6+	54	113.4±0.58	4.25±0.41	3.75±0.36	6.81	6.39	68.73
7+	53	117.48±0.73	5.32±0.52	4.53±0.44	4.08	3.6	71.2
8+	56	123.18±0.88	6.57±0.62	5.33±0.5	5.7	4.85	74.65
9+	53	127.71±0.83	6.07±0.59	4.75±0.46	4.53	3.68	77.4
10+	54	131.28±0.89	6.52±0.63	4.97±0.48	3.57	2.8	79.56
11+	54	136.39±1.3	9.56±0.92	7.01±0.67	5.11	3.89	82.66
12+	52	144.31±1.05	7.57±0.74	5.25±0.51	7.92	5.81	87.46
13+	50	151.74±1.36	9.63±0.96	6.35±0.63	7.43	5.15	91.96
14+	50	156.19±1.02	7.23±0.72	4.63±0.46	4.45	2.93	94.66
15+	50	159.9±0.85	5.98±0.6	3.74±0.37	3.71	2.38	96.91
16+	52	160.15±0.59	4.23±0.41	2.64±0.26	0.25	0.16	97.06
17+	49	164.37±0.65	4.58±0.46	2.79±0.28	4.22	2.64	99.62
18+	42	164.8±0.77	4.99±0.54	3.03±0.33	0.43	0.26	99.88

Abs.Grw- Absolute Growth, Gr%per annum-Growth percentage per annum, Grw Grad-Growth Gradient

Table 2: Statistical constants of Stature in cm of Rabha Girls

Age (years)	No.	Mean±SE	SD±SE	CV±SE	Abs.Grw	Gr%per annum	Grow Grad
		Stature					
3+	46	92.11±0.65	4.42±0.46	4.8±0.5			59.92
4+	54	100.16±0.62	4.54±0.44	4.53±0.44	8.05	8.73	65.16
5+	50	106.09±0.63	4.46±0.45	4.2±0.42	5.93	5.92	69.02
6+	56	112.66±0.87	6.48±0.61	5.75±0.54	6.57	6.19	73.29
7+	56	117.81±0.91	6.84±0.65	5.81±0.55	5.15	4.57	76.64
8+	52	122.93±1.06	7.66±0.75	6.23±0.61	5.12	4.35	79.98
9+	50	128.38±0.84	5.97±0.6	4.65±0.47	5.45	4.43	83.52
10+	52	132.74±1.05	7.59±0.74	5.72±0.56	4.36	3.4	86.36
11+	56	141.77±1.2	9±0.85	6.35±0.6	9.03	6.8	92.23

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12+	50	146.48±0.89	6.31±0.63	4.31±0.43	4.71	3.32	95.3
13+	52	149.86±0.61	4.38±0.43	2.92±0.29	3.38	2.31	97.5
14+	55	152±0.7	5.19±0.49	3.41±0.33	2.14	1.43	98.89
15+	54	152.21±0.48	3.56±0.34	2.34±0.23	0.21	0.14	99.02
16+	50	152.39±0.76	5.34±0.53	3.5±0.35	0.18	0.12	99.14
17+	46	153.02±0.89	6.05±0.63	3.95±0.41	0.63	0.41	99.55
18+	45	153.7±0.81	5.44±0.57	3.54±0.37	0.68	0.44	99.99

Abs.Grw- Absolute Growth, Gr%per annum-Growth percentage per annum, Grw Grad-Growth Gradient

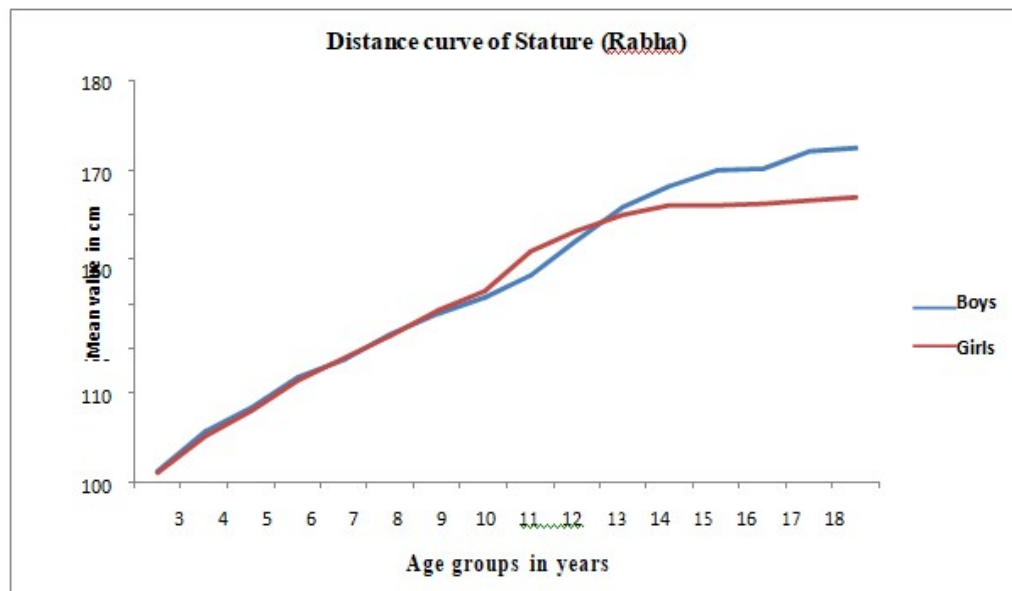


Fig. 1: Distance Curve of Stature of Rabha Children

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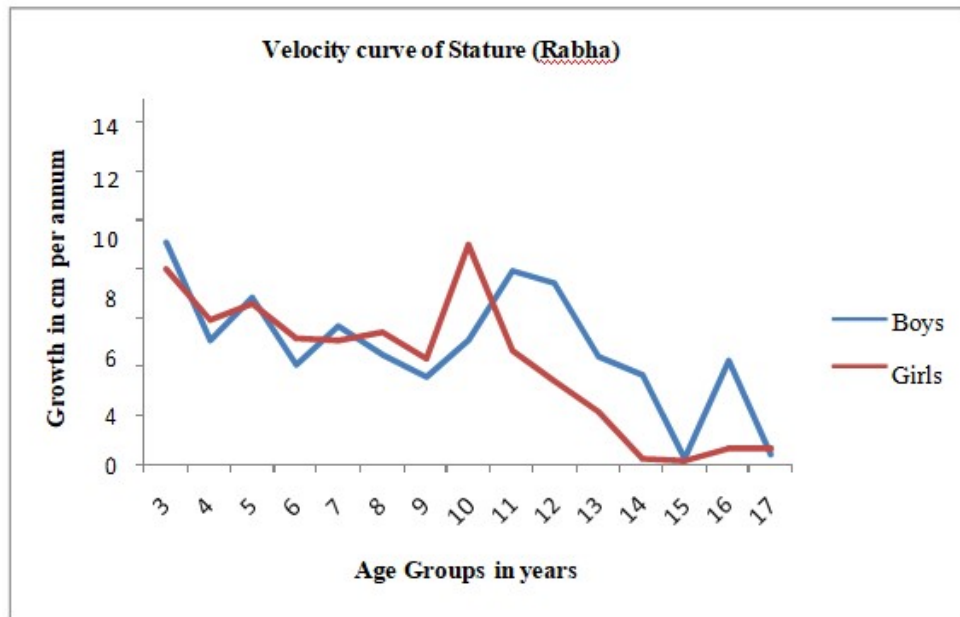


Fig. 2: Velocity Curve of Stature of Rabha Children

The distance curve of the body weight for both the sexes shows an upward movement continuously from 3 years to 18 years (Tables 3&4; Fig. 3&4). But the rate of increment varies across the age groups. The maximum rate of increase among boys is between 11 and 12 years of age (5.55 kg), whereas among the girls it is between 10 to 11 years (6.55 kg). From 3 to 9 years the boys are heavier than the girls but thereafter from 10 years the girls become heavier till the age of 14 years. From 15 years onwards the boys are again higher in weight than the girls.

The velocity curve of the boys shows two small peaks between the ages of 5 and 6 years and 7 and 8 years respectively followed by the highest peak between the ages of 11 and 12 years. In case of girls prior to the highest peak between 10 and 11 years there is a single peak between 6 and 7 years. Following the highest peak there are two more peaks between ages of 12 and 13 years and 15 and 16 years in case of boys while in girls there are three more peaks between the ages of 12 and 13 years, 13 and 14, 15 and 16 years (Tables 3&4; Fig. 3&4).

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Growth Gradient: It could be seen that at every age group, the girls are more advanced in the attainment of the mature size than their male counterparts. At 3 years the girls have attained 19.12% of their mature body weight while the boys attained 18.44% of their maturity. At 3 years the girls have to cover another 80.67% of increase in body weight and the girls 81.52% to attain maturity (Tables 3&4).

Table 3: Statistical constants of Body Weight in kg of Rabha Boys

Age (years)	No.	Mean±SE	SD±SE	CV±SE	Abs.Grw	Gr%per annum	Grw Grad
		Body Weight					
3+	48	10.04±0.31	2.14±0.22	21.31±2.18	3.08	30.68	18.44
4+	50	13.12±0.35	2.47±0.25	18.83±1.88	1.13	8.61	24.09
5+	52	14.25±0.38	2.75±0.27	19.3±1.89	3.05	21.4	31.77
6+	54	17.3±0.3	2.22±0.21	12.83±1.23	1.78	10.29	35.03
7+	53	19.08±0.31	2.27±0.22	11.9±1.16	2.57	13.47	39.75
8+	56	21.65±0.42	3.13±0.3	14.46±1.37	1.95	9.01	43.33
9+	53	23.6±0.4	2.94±0.29	12.46±1.21	1.53	6.48	46.14
10+	54	25.13±0.51	3.77±0.36	15±1.44	3.15	12.53	51.93
11+	54	28.28±0.76	5.56±0.54	19.66±1.89	5.55	19.63	62.12
12+	52	33.83±0.81	5.87±0.58	17.35±1.7	5.34	15.78	71.92
13+	50	39.17±0.86	6.06±0.61	15.47±1.55	4.2	10.72	79.64
14+	50	43.37±0.92	6.53±0.65	15.06±1.51	2.92	6.73	85
15+	50	46.29±0.74	5.23±0.52	11.3±1.13	3.88	8.38	92.12
16+	52	50.17±0.63	4.56±0.45	9.09±0.89	1.85	3.69	95.52
17+	49	52.02±0.87	6.06±0.61	11.65±1.18	2.42	4.65	99.96
18+	42	54.44±1.34	8.66±0.94	15.91±1.74			

Abs.Grw- Absolute Growth, Gr%per annum-Growth percentage per annum, Grw Grad-Growth Gradient

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Table 4: Statistical constants of Body Weight in kg of Rabha Girls

Age (years)	No.	Mean±SE Body Weight	SD±SE	CV±SE	Abs.Grow	Gr%per annum	Grow Grad
3+	46	9.26±0.19	1.31±0.14	14.15±1.47			19.12
4+	54	11.65±0.36	2.67±0.26	22.92±2.21		2.39	25.81 24.05
5+	50	13.92±0.34	2.42±0.24	17.39±1.74		2.27	19.48 28.74
6+	56	15.93±0.38	2.82±0.27	17.7±1.67		2.01	14.44 32.89
7+	56	18.81±0.48	3.59±0.34	19.09±1.8		2.88	18.08 38.83
8+	52	21.46±0.46	3.35±0.33	15.61±1.53		2.65	14.09 44.3
9+	50	24.01±0.43	3.07±0.31	12.79±1.28		2.55	11.88 49.57
10+	52	26.53±0.64	4.6±0.45	17.34±1.7		2.52	10.5 54.77
11+	56	33.08±0.98	7.35±0.69	22.22±2.1		6.55	24.69 68.29
12+	50	36.36±0.78	5.55±0.56	15.26±1.53		3.28	9.92 75.06
13+	52	40.41±0.86	6.21±0.61	15.37±1.51		4.05	11.14 83.42
14+	55	43.63±0.65	4.84±0.46	11.09±1.06		3.22	7.97 90.07
15+	54	43.97±0.57	4.16±0.4	9.46±0.91		0.34	0.78 90.77
16+	50	47.41±1.01	7.12±0.71	15.02±1.5		3.44	7.82 97.87
17+	46	48.08±0.96	6.49±0.68	13.5±1.41		0.67	1.41 99.26
18+	45	48.34±0.93	6.24±0.66	12.91±1.36		0.26	0.54 99.79

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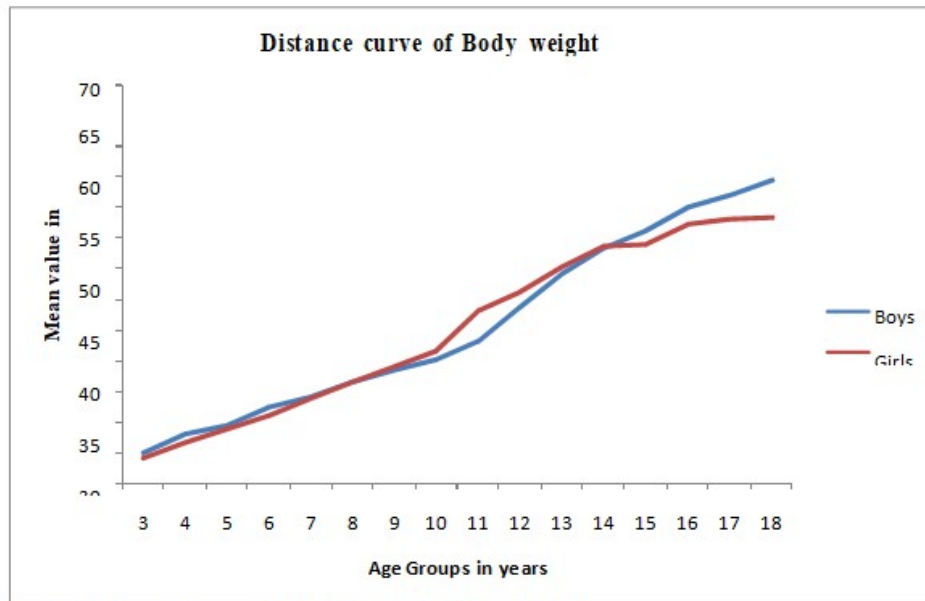


Fig. 3: Distance Curve of Body Weight of Rabha Children

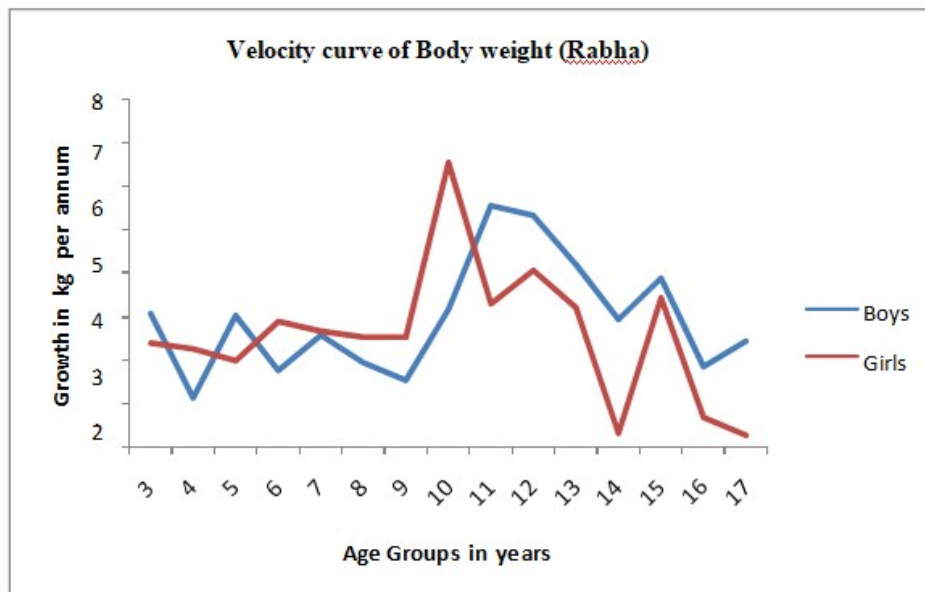


Fig.4: Velocity Curve of Body Weight of Rabha Children

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Secular Change

When the present data on the stature of the Rabha boy are compared with that of the data collected in the year 1978 (Choudhury, 1978) it is found that there is a positive secular change across all age groups except 11 years and 16 years where a negative change of magnitude 1.67cm and 1.18 cm is observed. The maximum positive increase of 3.39 cm is observed in the 18 age group followed by 3.25 cm in the 6 age group. There is an overall average increment of 1.75 cm in stature of the Rabha boys (Table 5).

Table 5: Secular Change in the Stature of Rabha Boys

Age grp	Stature of RabhaBoys in cms in 2018.	Stature of Rabha Boysin cms in 1978	Secular Change across different age groups
3+	92.4	-----	
4+	101.53	98.41	3.12
5+	106.59	104.78	1.81
6+	113.4	110.15	3.25
7+	117.48	116.97	0.51
8+	123.18	120.08	3.1
9+	127.71	125.98	1.73
10+	131.28	129.86	1.42
11+	136.39	138.06	-1.67
12+	144.31	141.36	2.95
13+	151.74	149.63	2.11
14+	156.19	154.54	1.65
15+	159.9	158.88	1.02
16+	160.15	161.33	-1.18
17+	164.37	161.33	3.04
18+	164.8	161.41	3.39

Average gain in ht=	1.75
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It could be seen from the table 6 that there is a positive secular change across all age groups of the Rabha girls. The maximum increment of 4.84 cm is observed in the age group of 12 years followed by 3.42 cm in the 18 age group. The overall average increment in stature in the present study compared to that of the study in 1978 is found to be 2.88 cm in the Rabha girls.

Table 6: Secular Change in the Stature of Rabha Girls

Age grp	Stature of RabhaGirls in cms in 2018.	Stature of RabhaGirls in cms in 1978	Secular Change across diff age grps
3+	92.11	-----	
4+	100.16	96.82	3.34
5+	106.09	102.89	3.2
6+	112.66	109.78	2.88
7+	117.81	115.17	2.64
8+	122.93	119.91	3.02
9+	128.38	127.4	0.98
10+	132.74	131.77	0.97
11+	141.77	138.49	3.28
12+	146.48	141.64	4.84
13+	149.86	147.14	2.72
14+	152	148.92	3.08
15+	152.21	148.93	3.28
16+	152.39	149.9	2.49
17+	153.02	149.94	3.08
18+	153.7	150.28	3.42

Average gain in ht=	2.88
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From the age of 4 years to 11 years there is a negative secular change in the weight of the Rabha boys. But from 12 years onwards up to 18 years there is a positive change in the weight of the Rabha boys of the present study compared to that of the study in 1978. An overall average increase of 0.19 kg is observed across all the age groups (Table 7).

Table 7: Secular Change in the Weight of Rabha Boys

Age group	Weight of Rabha Boys in kg in 2018.	Weight of Rabha Boys in kg in 1978	Secular Change across diff age grps
3+	10.04	-----	
4+	13.12	14.41	-1.29
5+	14.25	16.14	-1.89
6+	17.3	17.93	-0.63
7+	19.08	20.17	-1.09
8+	21.65	21.59	0.06
9+	23.6	23.96	-0.36
10+	25.13	25.7	-0.57
11+	28.28	29.86	-1.58
12+	33.83	32.02	1.81
13+	39.17	38.61	0.56
14+	43.37	41.82	1.55
15+	46.29	45.4	0.89
16+	50.17	49.16	1.01
17+	52.02	51.04	0.98
18+	54.44	51.08	3.36

Average gain in wt =	0.19
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In the earlier age groups from 4 to 9 years there is a negative secular change in the weight of the Rabha girls of the present study compared to that of the study undertaken in 1978. However, from 10 years onwards up to age 18 years there is a positive increase in the weight of the girls. The highest increment of 2.39 kg is observed in the 11 and 12 years age group in the weight of the present study. There is an overall average increase 0.27 kg in the weight of the Rabha girls (Table 8).

Table 8: Secular Change in the Weight of Rabha Girls

Age grp	Weight of RabhaGirls in kg in 2018.	Weight of RabhaGirls in kg in 1978	Secular Change across diff age grps
3+	9.26	-----	
4+	11.65	14.28	-2.63
5+	13.92	15.38	-1.46
6+	15.93	16.81	-0.88
7+	18.81	19.07	-0.26
8+	21.46	20.97	0.49
9+	24.01	24.5	-0.49
10+	26.53	26.51	0.02
11+	33.08	30.69	2.39
12+	36.36	34.66	1.7
13+	40.41	39.69	0.72
14+	43.63	42.81	0.82
15+	43.97	43.05	0.92
16+	47.41	46.9	0.51
17+	48.08	46.96	1.12
18+	48.34	47.19	1.15

Average gain inwt=	0.27
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Discussion

In the present study, height and weight from 3 to 18 years of both sexes of the Rabha community have been undertaken. From the distance curves it could be seen that there is a continuous increase in the mean values of height and weight from 3 to 18 years in children but this increase is not a uniform one. The stature of the Rabha boys was greater than that of girls except from 9 to 12 years when the girls are taller. The velocity curve shows that the highest spurt in stature occurs between 11 and 12 years in Rabha boys and 10 and 11 years in Rabha girls. Thus, it is noticed that a fluctuating trend in growth is noticed in the growth pattern of the two sexes. From the present study it could be seen that in case of Rabha boys the adolescent spurt occurs between 12 and 13 years in the stature and body weight.

Stature has attained 56% of maturity at 3 years among the boys and 59.92% among the girls. In case of body weight least growth has been noticed at 3 years and maximum growth takes place before and after adolescence. There is no clear distinction in the growth pattern in terms of weight especially in the early age groups. The present study revealed that there are differences between boys and girls in respect of growth patterns, especially during the adolescent period.

An examination of the secular change shows that among the Rabhas there is a gain of 1.75cm in height and 0.19kg in weight in boys between 1978 and 2018. In girls the gain in height was 2.88 cm and weight gain is 0.27 kg. It is apparent, therefore, that the gain in height is minimal and in weight it is negligible among the Rabha boys. In Rabha girls however, there is considerable increase in height but weight gain is again minimal.

This minimal average weight gain both in the boys and the girls is the result of negative growth during the early age period more particularly up to the age of 11 years. Such a negative result is not observed in case of height except at 11 and 16 years in case of boys. The Rabha girls are found to show a better performance than that of the boys. The lesser gain in height and the much lesser gain in weight during the last forty years might lead to the more or less the similar height and weight of the Rabhas at present despite the Rabhas having taller stature and clearly heavier weight in 1978.

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