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# Pattern of Adolescent Growth Among the Brahmin Girls – Rural-Urban Variation

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## ABSTRACT

*A cross-sectional study of adolescent growth was undertaken among the Brahmin girls residing in rural and urban areas of Sagar districts, Madhya Pradesh to evaluate the urban-rural differences. Six anthropometric measurements, such as weight, stature, sitting height, head circumference, upper arm circumference and chest girth are taken into consideration. Though the urban girls show consistently higher values of weight, stature, sitting height and chest girth than the rural girls, but in case of head circumference and upper arm circumference they show consistently lower values. The maximum increment occurs between the ages 13 and 14 years in all the six measurements in both rural and urban girls.*

## Introduction

Growth studies among the children have always occupied a very prominent position in the scientific research curriculum and have always received serious attention of the researchers engaged in the field of both medical science and physical anthropology all over the world<sup>1</sup>. Physical growth in man is the result of interaction of his environmental and genetical constitution. Several factors, such as genetic, nutritional, disease, socio-economic, psychological, etc. are believed to be res-

ponsible for individual as well as population variation in physical growth. Sudden inflexion in the rate of growth at adolescence represents a major event in the growth pattern of the children<sup>2</sup>.

Many studies demonstrated that pattern of growth may vary between rural and urban residence<sup>3-7</sup>. It reveals from the nationwide growth study in India that the rate of growth is higher in urban than in rural children<sup>8</sup>. Similar observation was found among Punjabi children<sup>9</sup>,

and the same is also observed among Bengali girls<sup>2</sup>. Environmental and cultural factors are responsible for urban-rural differences<sup>10</sup>. Keeping the above in view an attempt has been made in the present study to provide certain information on adolescent growth among the rural and urban girls belonging to the Brahmin caste of Sagar district, Madhya Pradesh, India.

**Materials and Methods**

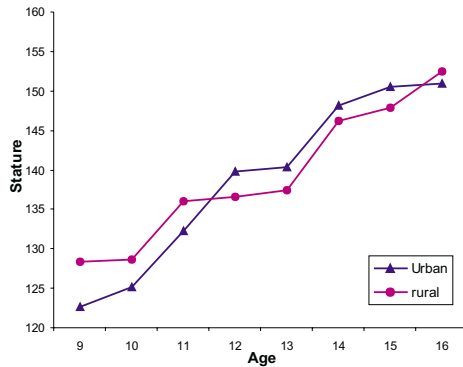
The present study was based on cross-sectional data of 414 apparently healthy Brahmin girls, aged 9 to 16 years from the school children of Dhana village, Sagar District, Madhya Pradesh. Age of the girls was ascertained from the school birth records. It may be mentioned that school birth records are very often not corrected up to the actual date of birth. Since most of the villagers do not have birth certificate, there is always a chance of under reporting while the girls would be admitted in the school. So, the age of the girls was also ascertained by consulting school birth records as well as by cross-checking of local events and other documentary evidences which is correct up to the month, but not up to date of birth. Anthropometric measurements, such as body weight, stature, sitting height, head circumference, upper arm circumference and chest girth were taken on the girls using standard technique<sup>11</sup>. Data of the present study were collected during November, 1999. For the sake of comparison the urban data consists of 369 sample were collected from the Sagar town of Madhya Pradesh.

**Results and Discussion**

Data on cross-sectional adolescent growth of six anthropometric traits of the Brahmin girls are set out in Table 1. It is evident that the mean values of these

traits as a whole, increase steadily from 9 to 16 years of age in both the rural and urban areas.

When the data on stature are analyzed a marked rise is seen between 13 and 14 years among the rural as well as the urban girls. Urban girls show considerably higher values than rural girls, which is noticed from 12 to 15 years, whereas, a reverse trend is noticed from 9 to 11 years. However, in 16 years the rural girls show slightly higher value of stature than their urban counterpart (Table 1 and Figure 1). Urban girls show comparatively higher values of body weight than rural girls from 12 to 16 years. But from 9 to 11 years a reverse trend is noticed. A marked rise in weight is observed between 13 and 14 years among the girls in the rural and urban areas (Table 1 and Figure 2).



*Fig. 1. Stature of urban and rural Brahmin girls.*

Like weight and stature, sitting height in the urban girls also show considerable higher values than the rural girls. This is evident from 9 to 16 years. The only exception on this case is 11 years in which a reverse trend is noticed. However, a marked rise is observed between 13 and 14 years in both rural and

**TABLE 1**  
 ANTHROPOMETRIC MEASUREMENTS OF BRAHMIN GIRLS IN URBAN AND RURAL AREAS

Age	N	Stature (cm)		Weight (kg)		Sitting height (cm)		Head circumference (cm)		Upper arm circumference (cm)		Chest girth (cm)	
		X	SD	X	SD	X	SD	X	SD	X	SD	X	SD
Urban													
9	46	122.6	2.64	22.4	1.29	64.2	1.36	50.6	4.27	16.2	4.41	57.9	1.29
10	44	125.1	1.53	23.3	9.55	66.2	8.62	50.6	4.11	16.7	3.85	58.4	1.26
11	48	132.2	1.59	26.4	1.45	68.3	1.38	51.6	4.57	17.1	4.43	61.5	1.45
12	47	139.8	1.78	30.4	1.58	71.4	1.37	51.5	5.76	17.9	5.55	64.5	1.71
13	45	140.4	1.88	31.6	1.48	71.9	1.14	52.1	4.36	18.6	4.09	66.8	1.48
14	47	148.1	1.23	38.8	1.78	75.7	1.37	53.2	5.69	20.4	5.28	73.8	1.37
15	46	150.5	1.49	40.7	1.42	77.4	1.29	52.8	4.07	21.2	5.63	75.7	1.36
16	46	151.0	1.49	42.4	1.49	78.2	1.29	53.9	7.26	21.6	5.63	76.7	1.42
Rural													
9	50	128.4	4.17	26.0	3.25	64.2	4.17	51.7	2.12	17.7	0.92	60.2	2.69
10	50	128.6	4.88	26.8	4.31	65.2	7.28	52.0	1.70	17.8	0.85	60.3	3.32
11	50	136.0	8.06	27.6	4.67	69.3	2.97	52.0	1.56	18.4	1.20	61.2	2.97
12	64	136.6	6.56	28.4	3.68	70.1	3.36	52.1	1.44	18.6	1.36	61.3	7.76
13	50	137.4	8.41	29.4	6.08	70.5	3.68	52.1	2.12	18.7	1.84	61.3	7.76
14	50	146.2	6.58	35.0	5.09	75.1	4.31	53.4	1.06	21.0	2.40	70.1	4.45
15	50	147.9	5.66	37.5	6.08	76.5	3.61	53.4	1.70	21.9	2.26	73.5	5.80
16	50	152.5	5.16	42.3	3.75	76.7	2.19	54.8	1.98	22.2	1.34	78.3	4.10

urban girls (Table 1 and Figure 3). Unlike the earlier cases in case of head circumference, rural girls show considerably higher values than urban girls in different ages. However, a marked rise in this case also noticed between 13 and 14 years in both the sectors (Table 1 and Figure 4).

Head circumference and upper arm circumference also show consistently higher values in the rural girls than the urban girls. However, the differences are comparatively more in the ages 9,10 and 11 years. A marked rise is evident between 13 and 14 years in both the rural and urban girls in this case (Table 1 and Figure 5).

The chest girth is comparatively higher among the urban girls than the rural girls. The exceptions in this case are in 9, 10 and 11 years respectively. However, a marked rise in this case is observed between 13 and 14 years like the earlier cases (Table 1 and Figure 6).

Overall, it can be said that there exists a marked inflexion between 13 and 14 years in the distance curves in case of all the traits in both rural and urban girls. Though the urban girls show consistently higher values for weight, stature, sitting height and chest girth than the rural girls but in case of head circumference and upper arm circumference a reverse trend is noticed. Thus, the present study revealed inconsistent result of adolescent growth among the Brahmin girls in two different sectors.

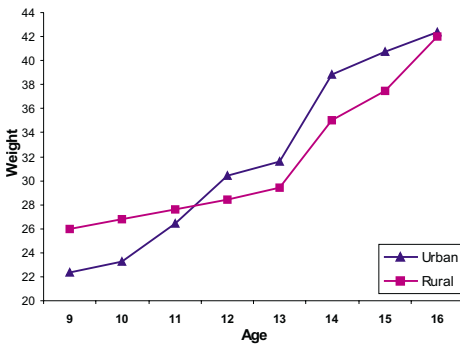


Fig. 2. Weight of urban and rural Brahmin girls.

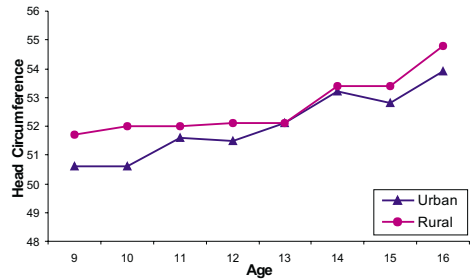


Fig. 4. Head circumference of urban and rural Brahmin girls.

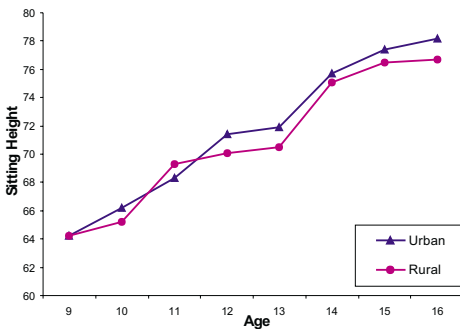


Fig. 3. Sitting height of urban and rural Brahmin girls.

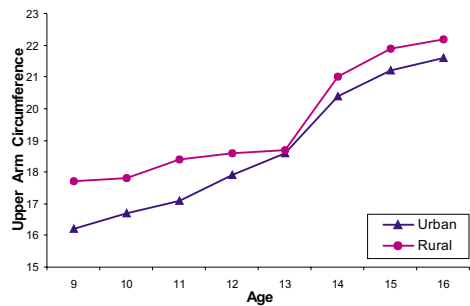


Fig. 5. Upper arm circumference of urban and rural Brahmin girls.

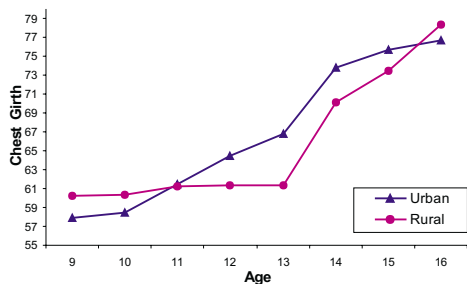


Fig. 6. Chest girth of urban and rural Brahmin girls.

**TABLE 2**  
RESULTS OF TWO-WAY ANALYSIS OF VARIANCE BETWEEN ANTHROPOMETRIC MEASUREMENTS IN RURAL AND URBAN AREAS

Variables	F	Significance
Stature	0.15	ns
Weight	0.13	ns
Sitting height	5.64	Significant
Head circumference	15.36	Significant
Upper arm circumference	24.73	Significant
Chest girth	1.20	ns

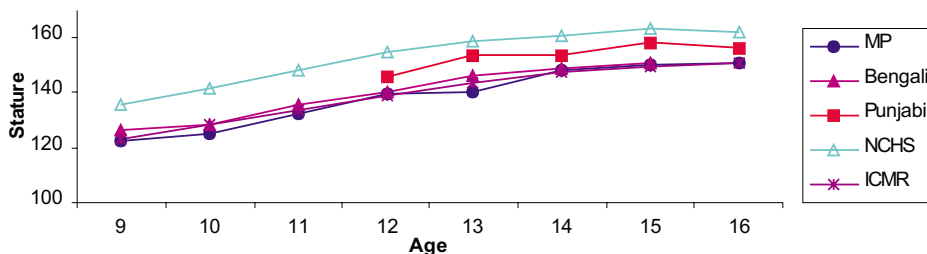


Fig. 7. Distance curve for stature of the present urban sample compared with others.

Comparative account of stature shows that NCHS<sup>15</sup> data is always higher in position and the rest data are very close each other though Punjabi girls is always higher than other three communities both in urban and rural samples (Figures 7 and 8).

Comparative account of weight also shows that NCHS data is always higher in position and the rest data are very close each other (Figures 9 and 10).

Two-way analysis of variance between mean values of anthropometric measurements in rural and urban areas reveals that there exist significant differences in respect of sitting height, head circumference and upper arm circumference. But in case of other three measurements, difference between two sectors is not significant (Table 2).

In general, children in urban areas tend to be healthier, taller and heavier than rural children<sup>12</sup>. FAO's Fifth World Survey data stated that rural children are more stunted and wasted (0–5 years) than urban children<sup>13</sup>. But, at large urban centers of the developing world over the past two or three decades, a different picture was seen<sup>14</sup>. Urban centers are not unanimously a healthy environment because rapid inflexion of population growth due to migration and natural increase, is a dramatic shift in demographic and socioeconomic composition of urban areas and had given birth to urban slums which is worst than rural areas. So, the magnitude of differences is dependent on type of urban and rural settlements such as for urban settlements, whether it is urban slum or normal urban settlers and for rural areas, it is isolated rural areas or peri-urban or rural community.

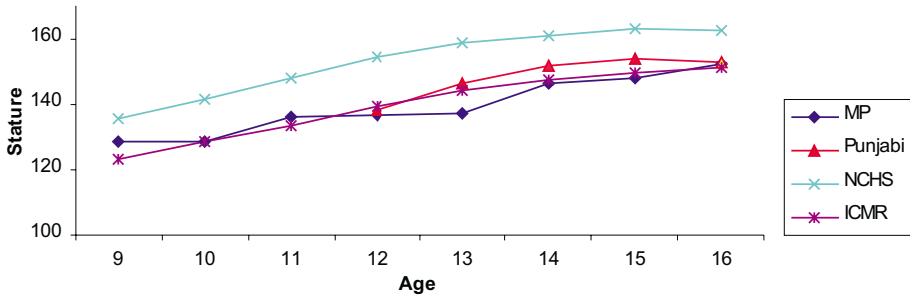


Fig. 8. Distance curve for stature of the present rural sample compared with others.

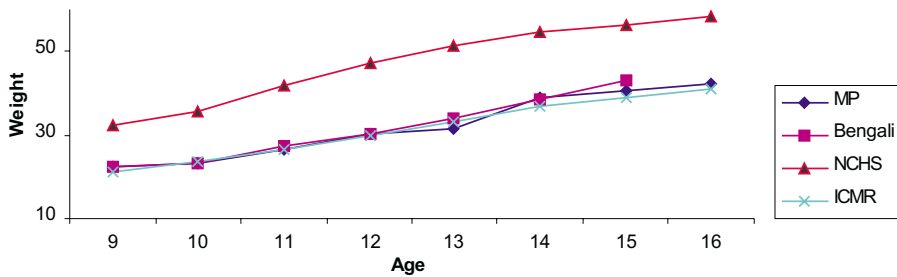


Fig. 9. Distance curve for weight of the present urban sample compared with others.

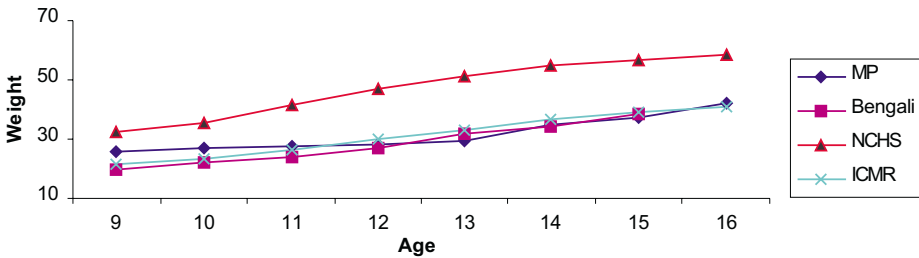


Fig. 10. Distance curve for weight of the present rural sample compared with others.

If, we acknowledge the importance between urban-rural differences, we have to prove an adequate explanation of why such urban-rural differences exist. Generally, it depends on many exogenous factors – (i) Environmental factors such as availability of health care, improved water supplies, transportation, roads, electricity etc. and (ii) cultural differences where within the same opportunities, peoples choices and preferences (e.g., In-

fant feeding practices) may differ and dependent where they reside and is also dependent on value structure.

It is seen that rural children are stunted i.e. their linear growth may be arrested due to their inadequate diet may lead to chronic energy deficiency. Beside this, other exogenous factors such as housing density, availability of safe water, excreta disposal practices, household hy-

giene, access to and distance to roads, availability of health services, mothers education etc. are less accessible than ur-

ban children. But in urban children, the better nutrition, better health care etc interrupt the linear growth retardation.

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## ADOLESCENTNI OBRAZAC RASTA U BRAHMINSKIH DJEVOJAKA – RAZLIKE IZMEĐU SELA I GRADA

### SAŽETAK

Transverzalna studija adolescentnog rasta napravljena je među Brahminskim djevojčicama koje žive u seoskim i urbanim područjima oblasti Sagar, Madhya Pradesh, Indija, kako bi se procijenio utjecaj seoskog i gradskog života na rast. U procjeni rasta korišteno je šest antropometrijskih mjera, kao što su tjelesna visina i masa, sjedeća visina, opseg glave, opseg nadlaktice, opseg prsnog koša. Premda su djevojčice iz grada pokazale konzistentno veće vrijednosti tjelesne mase, visine i sjedeće visine te opsega prsnog koša od seoskih djevojčica, one su u opsegu glave te opsegu nadlaktice imale sustavno niže vrijednosti. Najveći je rast i u seoskih i u gradskih djevojčica zabilježen u dobi od 13 i 14 godina i to u svih 6 tjelesnih mjera.