PRINT: ISSN 0970-9274 ONLINE: 2456-6608
DOI: 10.31901/24566608.1993/04.03.03

JOURNAL OF
HUMAN ECOLOGY

J. Hum. Ecol., 4(3): 221-226 (1993)

Proportionate Growth Characteristics of Certain Selected Physical Traits among Yadava and Vadabalija Boys of Visakhapatnam, Andhra Pradesh, India

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KEY WORDS Growth. Anthropometry. Yadava. Vadabalija. Andhra Pradesh.

ABSTRACT This is the first comprehensive proportionate growth study of male children of Yadava and Vadabalija parentage. The cross-sectional proportional growth survey was undertaken in rural educational institutions situated in the Visakhapatnam district of Andhra Pradesh, during 1986 and 1987. The sample consisted of 757 Yadava and 845 Vadabalija healthy boys aged 1 to 20 years. In this paper proportionate growth of four linear and transverse measurements were presented including patterns of change with increase in age. Statistical significant differences were observed in some age groups among these groups.

The proportionate growth characteristics have been studied by Sharma (1970), Nath (1972), Havapalti and Bela Adler (1975), Krishna Rao (1981), Martorell et al. (1988). But comparative studies of populations engaged in different occupational groups are negligible. Keeping this in mind, in the present study an attempt has been made to study the differential growth patterns of agricultural Yadava and fishing Vadabalija boys from 1 to 20 years.

MATERIAL AND METHODS

The Yadavas (Gollas) of Andhra Pradesh are predominantly a pastoral community occasionally engaged in farming. Vadabalija was one of the nine important fishing communities found in the North-East Coastal tract of Andhra Pradesh. Data were collected, cross-sectionally, on 757 Yadava and 845 Vadabalija boys aged 1 to 20 years, from 23 villages of Bheemunipatnam and Anandapuram *Mandals* of Visakhapatnam district of Andhra Pradesh during January, 1986 to June, 1987. The exact date of birth was collected for every subject either from the concerned school registers or from birth records of the village *panchayats*. The age of each individual was calculated to three decimal places after Tanner et al. (1966).

The measurements on individual were taken during the working hours of the schools from 9 A.M. to 12.10 P.M. and 1.30 P.M. to 3.40 P.M. with minimum clothing. All bilaterally represented measurements were taken on the left hand side of the subject. The measurements sitting height, height of anterior iliac spine, total arm length, antero-posterior chest diameter, transverse chest diameter, biacromial diameter and bi-ilio-cristal diameter were taken after Weiner and Lourie (1969).

RESULTS AND DISCUSSION

Proportionate growth characteristics of bi-iliocristal diameter versus biacromial diameter, antero-posterior chest diameter *versus* transverse chest, total arm length *versus* height of anterior iliac spine; and height of anterior iliac spine *versus* sitting height and significant differences by age among Yadava and Vadabalija boys have been depicted in tables 1 to 4. The adolescent growth spurt' of

Table 1 : Proportionate growth characteristics of bi-illocristal diameter *versus* biacromial diameter and significant differences w.r.t. age among Yadava and Vadabalija boys

Yadava					*Age*	*Vadabalija*					*Comparison 't' value*
N	$\bar{x}$	r^2	*F*	*T*		*N*	$\bar{X}$	r^2	*F*	*T*	
48	80.59	0.15	8.34^3	2.88^3	1	47	85.80	0.24	14.58^3	3.82^3	2.80^2
46	77.87	0.07	3.29	1.81	2	37	80.42	0.20	8.95^3	2.99^3	1.37
44	77.19	0.16	8.09^3	2.84^3	3	34	78.74	0.07	2.46	1.57	1.09
46	74.91	0.04	1.68	1.30	4	37	76.56	0.43	26.37^3	5.13^3	1.55
82	73.24	0.22	22.72^2	4.76^3	5	44	74.74	0.31	19.20^3	4.38^3	1.82
55	70.90	0.08	4.70^2	2.17^1	6	65	73.13	0.08	5.75	2.40^3	2.541
52	70.45	0.12	6.96^2	2.64^-	7	47	73.02	0.36	24.91^3	4.99^3	3.15^2
48	68.44	0.03	1.47	1.21	8	58	70.45	0.48	52.67^3	7.26^3	2.63^2
47	67.74	0.08	3.85	1.96^1	9	45	69.84	0.11	5.61^2	2.37^1	2.56^1
36	69.08	0.02	0.70	0.84	10	59	69.37	0.47	50.05^3	7.07^3	0.36
27	68.97	0.004	0.10	0.32	11	44	69.75	0.20	10.73^3	3.28^3	0.61
28	68.77	0.03	0.71	0.84	12	26	68.97	0.04	1.01	1.01	0.17
24	67.66	0.06	1.51	1.23	13	48	68.08	0.07	3.40	1.84^1	0.38
31	66.32	0.005	0.14	0.37	14	35	68.66	0.27	12.01^3	3.46^3	2.30^1
24	67.60	0.04	0.86	0.93	15	38	67.82	0.30	15.77^3	3.97^3	0.23
27	67.49	0.02	0.43	0.65	16	54	67.83	0.02	1.09	1.04	0.33
22	65.93	0.05	1.03	1.01	17	33	67.31	0.09	3.25	1.80^1	1.18
23	66.34	0.001	0.02	0.16	18	34	66.33	0.42	22.98^3	4.79^3	0.01
20	66.85	0.0004	0.01	0.09	19	21	66.50	0.04	0.80	0.89	0.31
27	67.04	0.12	3.55	1.88^2	20	39	66.45	0.10	4.31^2	2.08^1	0.70
757	—	0.91	8217.23^3	90.65^3	—	845	—	0.93	11340.98^3	106.49^3	—

1 = Significant at 5% level 2 = Significant at 1% level 3 = Significant at 0.1% level

proportinate growth was not clear as that of physical growth in both the groups.

The value of 'r^2' was maximum for Yadava boys at 1 year in all the combinations (Tables 2 to 4) except for the Biiliocristal diameter versus Biacromial diameter (Table 1), which was observed at 5 years. On the contrary, the value of 'r^2' for Vadabalija boys has been maximum at 3 years for height of anterior iliac spine versus sitting height (Table. 4). The values for other combinations was maximum at 8 years, 10 years and 8 years respectively in between biiliocristal diameter versus biacromial diameter, antero-posterior chest diameter versus transverse chest diameter and total arm length versus height of anterior iliac spine (Table 1 to 3). The 't' values shows the significance of 'r^2'. The whole 't' values as observed from tables 1 to 4 are highly significant at more than 0.1% level of probability for all combinations of measurements of both the communities. The 't' values at individual age groups ranging from 1 to 20 years are highly significant for all combinations of measurements in Vadabalija boys with a few exceptions; where as in Yadava boys the 't' values are highly significant for only total arm length *versus* height of anterior iliac spine in most of the age groups, and the 't' values for the other combinations are highly significant only for a few age groups. The 'F' values at all age groups are observed to be similar to the

Table 2 : Proportionate growth characteristics of antero-posterior chest depth *versus* transverse chest diameter and significant differences w.r.t. age among Yadava and Vadabalija boys

Yadava					*Age*	*Vadabalija*					*Comparison*
N	*X*	r^2	*F*	*T*		*N*	*X*	r^2	*F*	T	*'t' value*
48	74.38	0.20	11.55^3	3.39	1	47	71.96	0.002	0.07	0.26	1.17
46	70.94	0.02	0.67	0.82	2	37	70.30	0.02	0.92	0.96	0.36
44	73.36	0.02	0.90	0.95	3	34	75.45	0.02	0.67	0.82	1.22
46	77.05	0.03	1.25	1.12	4	37	78.72	0.001	0.02	0.15	1.53
82	78.17	0.03	2.11	1.45	5	44	78.72	0.12	5.91^2	2.43^3	0.60
55	76.58	0.03	1.37	1.17	6	65	77.88	0.16	11.69^3	3.42^3	1.38
52	78.17	0.0002	0.01	0.09	7	47	76.74	0.11	5.48^2	2.34^1	1.58
48	76.05	0.0003	0.01	0.11	8	58	76.45	0.30	23.84^3	4.88^3	0.39
47	75.90	0.10	5.06	2.25^1	9	45	75.51	0.25	14.35^3	3.79^3	0.43
36	77.26	0.05	1.81	1.35	10	59	75.46	0.35	31.32^3	5.60^3	1.78
27	76.42	0.07	2.04	1.43	11	44	76.11	0.15	7.20^2	2.68^3	0.27
28	75.64	0.07	1.95	1.39	12	26	76.88	0.01	0.25	0.50	0.76
24	75.03	0.003	0.06	0.24	13	48	76.09	0.03	1.26	1.12	0.80
31	75.49	0.001	0.04	0.20	14	35	77.77	0.31	15.06^3	3.88^3	1.78
24	77.70	0.04	1.02	1.01	15	38	79.38	0.18	7.92^3	2.81^3	1.08
27	75.89	0.04	1.01	1.00	16	54	77.55	0.13	8.14^3	2.85^3	1.22
22	78.36	0.09	2.21	1.48	17	33	76.57	0.18	6.63^2	2.57^3	1.35
23	77.20	0.004	0.07	0.28	18	34	77.49	0.09	3.23	1.80	0.24
20	76.24	0.13	2.68	1.64	19	21	77.37	0.01	0.28	0.53	0.72
27	75.93	0.06	1.57	1.25	20	39	77.48	0.13	5.57^2	2.36^3	1.37
757	—	0.86	4589.34^3	67.74^3	—	845	—	0.88	6099.84^3	78.10^3	—

1 = Significant at 5% level 2 = significant at 1% level 3 = Significant at 0.1% level.

't' values of significance for the regression function in both the communities with deviation at few age groups. It can therefore be inferred that the variation in growth of different dimensions of various measurements at each age of Yadava and Vadabalija boys was different.

The proportionate growth of biiliocristal *versus* biacromial diameter, total arm length *versus* height of anterior iliac spine declined with advancing age (Table 1 and 3) in both the groups. On the contrary antero-posterior chest depth *versus* transverse chest breadth Height of anterior iliac spine *versus* sitting height, increased with advancing age (Table 2 and 4) in both the groups.

When 't' test comparison is made between Yadava and Vadabalija boys for the age wise means of 1 to 20 years, significant differences are observed in 1, 6, 7, 8, 9 and 14 years of age biiliocristal versus Biacromial diameter; 7, 9, 11, 12 and 16 years of Total arm length *versus* Height of anterior iliac spine whereas rest of the combinations and age groups were observed not significant.

The mean values of proportionate growth characteristics were more or less similar to that of Maharashtrians (Sharma, 1970).

The growth differences observed between the Yadava and Vadabalija boys need to be explained at this juncture. The social status of both the caste groups in the prevailing Hindu caste system is low. The Vadabalija community in particular is very poor, their occupation (fishing) being not as dignified as that of the Yadavas (agriculturists), occupy a lower postion in the socieity and live mostly outside the villages,

Table 3 : Proportionate growth characteristics of total arm length versus height of anteroiliac spine and significant differences w.r.t age among Yadava and Vadabalija boys

Yadava					*Age*	*Vadabalija*					*Comparison 't' value*
N	$\bar{X}$	r^2	*F*	*T*		*N*	$\bar{X}$	r^2	*F*	*T*	
48	91.25	0.73	126.14^3	11.23^3	1	47	93.27	0.58	61.67^3	7.85^3	1.54
46	87.31	0.48	40.91^3	6.39^3	2	37	87.77	0.41	24.02^3	4.90^3	0.36
44	83.33	0.48	38.73^3	6.22^3	3	34	82.48	0.76	101.38^3	10.07^3	0.78
46	80.88	0.35	23.74^2	4.87^3	4	37	80.48	0.76	110.39^3	10.51^3	0.62
82	77.96	0.58	110.93^3	10.53^3	5	44	78.33	0.87	281.99^3	16.79^3	0.83
55	77.48	0.65	99.51^3	9.97^3	6	65	77.59	0.54	73.07^3	8.55^3	0.19
52	76.06	0.57	67.23^3	8.20^3	7	47	77.15	0.63	76.84^3	8.77^3	2.07^1
48	76.37	0.36	25.69^3	5.06^3	8	58	76.58	0.89	435.45^3	20.87^3	0.43
47	75.56	0.59	64.07^3	8.00^3	9	45	76.49	0.81	185.51^3	13.62^3	2.19^1
36	75.89	0.13	5.00^2	2.23^1	10	59	76.49	0.58	79.54^3	8.92^3	0.82
27	76.99	0.38	15.57^3	3.94^3	11	44	75.07	0.83	202.51^3	14.23^3	3.11^2
28	76.59	0.30	11.25^3	3.35^3	12	26	75.35	0.67	47.98^3	6.92^3	1.98^1
24	76.79	0.49	21.31^3	4.62^3	13	48	76.03	0.48	42.96^3	6.55^3	1.14
31	76.12	0.009	0.28	0.53	14	35	76.93	0.47	29.20^3	5.40^3	0.88
24	76.71	0.46	19.13^3	4.37^3	15	38	76.73	0.61	57.75^3	7.60^3	0.04
27	77.90	0.28	9.90^3	3.15^3	16	54	76.37	0.38	32.26^3	5.68^3	2.14^1
22	77.59	0.25	6.89^2	2.62^1	17	33	77.72	0.73	83.48^3	9.14^3	0.22
23	77.44	0.003	0.06	0.25	18	34	78.09	0.30	13.58^3	3.68^3	0.84
20	77.35	0.24	5.87^2	2.42^1	19	21	78.40	0.42	13.56^3	3.68^3	1.24
27	77.54	0.56	31.98^3	5.65^3	20	39	78.59	0.19	8.95^3	2.99^3	1.68
757	—	0.98	34691.22^3	186.25^3	—	845	—	0.97	35454.06^3	188.29^3	—

1 = Significant at 5% level 2 = Significant at 1% level 3 = Significant at 0.1% level.

consequently, they are educationally quite backward. Both the groups are lower income groups. The factors associated with socio-economic environment may play a role in limiting growth potential throughout the growth period. The socio-economic status of Yadava community is considerably better than the Vadabalija. However, owing to the occupation it is obvious that Vadabalijas have easy access to and may consume fish and other sea foods abundantly as also shown by other studies (Busi et al., 1987). This high consumption of protein rich food of Vadabalijas may have resulted in better growth.

Regarding the genetic differences, both Yadava and Vadabalija are reproductively isolated from one another and also strictly endogamous. Raja Rajeswari (1988) in her study observed some difference between these two communities in their demographic, genetic and other characters. These inherent genetic factors affect the velocity of growth among Vadabalija boys giving them a characteristic cross-sectional growth pattern for many variables, which is also quantitatively different from that observed among the Yadava boys. This would be consistent with what is known of genetic factors affecting growth and development (Tanner, 1962) and comparative growth studies of different ethnic groups (Eveleth and Tanner, 1976).

Table 4 : Proportionate growth characteristics of height of anterior iliac spine *versus* sitting height and significant differences w.r.t age among Yadava and Vadabalija boys

	Yadava				*Age*		*Vadabalija*				*Comparison 't' value*
N	*X*	r^2	*F*	*T*		*N*	*X*	r^2	*F*	*T*	
48	71.85	0.51	49.77^3	7.05^3	1	47	70.81	0.58	61.67^3	7.85^3	0.96
46	81.37	0.01	0.37	0.61	2	37	81.85	0.36	19.34^3	4.40^3	0.29
44	87.60	0.28	16.72^3	4.09^3	3	34	88.91	0.73	85.03^3	9.22^3	0.92
46	94.40	0.15	7.75^3	2.78^3	4	37	94.27	0.08	3.06	1.75^1	0.10
82	100.64	0.38	49.17^3	7.01^3	5	44	99.31	0.49	40.50^3	6.36^3	1.44
55	103.22	0.24	16.59^3	4.07^3	6	65	103.09	0.17	13.37^3	3.66^3	0.13
52	106.54	0.05	2.96	1.72^1	7	47	106.46	0.40	29.62^3	5.44^3	0.08
48	108.48	0.03	1.55	1.24	8	58	109.25	0.42	40.17^3	6.34^3	0.71
47	111.26	0.08	3.89	1.97^1	9	45	111.47	0.10	4.83^2	2.20^1	0.17
36	113.68	0.20	8.71^3	2.95^3	10	59	112.57	0.29	23.23^3	4.82^3	1.05
27	115.81	0.05	1.47	1.21	11	44	114.85	0.52	46.48^3	6.82^3	0.59
28	116.60	0.27	9.86^3	3.14^3	12	26	116.08	0.02	0.56	0.75	0.38
24	117.65	0.09	2.16	1.47	13	48	116.43	0.06	2.74	1.66^2	0.97
31	117.90	0.0003	0.01	0.10	14	35	119.10	0.15	5.98^2	2.44^1	0.93
24	117.41	0.002	0.05	0.22	15	38	119.35	0.05	1.95	1.40	1.33
27	117.27	0.06	1.63	1.28	16	54	119.88	0.07	4.18^2	-2.04^1	1.61
22	116.91	0.0001	0.003	0.05	17	33	118.85	0.23	9.47^3	3.08^3	1.26
23	117.58	0.02	0.36	0.60	18	34	117.38	0.005	0.16	0.40	0.14
20	118.25	0.01	0.20	0.45	19	21	116.67	0.18	4.11	2.03^1	1.03
27	117.88	0.003	0.06	0.25	20	39	112.93	0.007	0.27	0.52	1.67
757	—	0.96	16646.07^3	129.02^3	—	845	—	0.94	14509.26^3	120.45^3	—

1 = Significant at 5% level 2 = Significant at 1% level 3 = Significant at 0.1% level

ACKNOWLEDGEMENT

Dr. B. Dharma Rao thanks the financial support from C.S.I.R. as Pool Officer which enabled the author to carry out the analysis and preparation of the paper.

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