Anthropometric Profile and Development of Facial Hair in Male Athletes

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Abstract

The present investigation has been carried out to study the anthropometric profile and development of facial hair in male athletes. The data for the present study consists of 697 subjects including 347 athlete and 350 control boys ranging in age from 10 to 18 years. The athletes, who actively participated in various activities including running, jumping and throwing have been included in the present study. Sixteen anthropometric measurements viz. weight, stature, diameters, circumferences and skinfolds have been taken on each subject. The development of facial hair has been studied by five point maturity scale. There is a regular increase in all anthropometric measurements from 10 to 18 years in both athlete and control boys. The adolescent spurt has occurred earlier in athlete boys in most of the anthropometric measurements. The athlete boys are lighter in weight up to 14 years and shorter in stature up to 16 years than control boys followed by more weight and stature in athlete in the subsequent age groups. The athlete boys possess broader shoulders, hips and larger bony diameter of the extremities. The chest and calf circumferences are larger in athletes whereas the head and upper arm circumferences and all skinfolds are more in control boys. The development of facial hair is earlier in athletic boys with significant differences in stage II and III as compared to control boys.

Key words: Anthropometric Measurements, Development, Facial Hair, Athletes

Introduction

It has been established that physical or sports activity during childhood and youth results in persistently favourable influence in the physiological maturity. *Malina (1977)* reported that adolescent athletes have been found to be advanced in maturity. *Oppliger et al. (1986)* studied swimmers of 7-12 years and found them to be significantly taller, heavier and with greater lean body mass than controls. *Sidhu et al. (1998)* found athletes to be early maturer as compared to non-athletes.

Although much data have been accumulating about the effect of physical activity on the morphological profile but only few reports are available about the effect of physical activity on sexual maturation. So in the present investigation an attempt has been made to study if athletic activity has any influence on anthropometric profile and development of facial hair in male athletes ranging in age from 10 to 18 years.

Materials and Methods:

The data for the present study consist of 697 subjects including 347 athlete and 350 control boys ranging in age from 10 to 18 years. The athletes who actively participated in various activities including running (100 meter to 1500 meter), jumping (long and high) and throwing (short put, javelin and discs) have been included in the present study. The data on athletes have been mainly collected from National Institute of Sports (NIS), Punjabi University, Polo ground, Patiala and Guru Nanak Stadium, Ludhiana. The data on controls have been collected from various educational institutions of Patiala, Ludhiana, Mansa, Jalandhar, Hoshiarpur and Ropar. To study physical growth sixteen anthropometric measurements viz. weight, stature, diameters (biacromial,

bicristal, humerus bicondylar, wrist, femur bicondylar, ankle), circumferences (head, chest, upper arm, calf) and skinfolds (triceps, suprailiac, subscapular, calf) have been taken on each subject by following standard technique given by *Tanner et al. (1969).*

The data collected have been grouped into nine age groups, each of one year duration i.e. 9.500 – 10.499 up to 17.500 – 18.499 for both athlete and control boys separately. The data have been subjected to various statistical tests viz. mean, standard deviation, standard error or mean. 't' test has been applied to compare the athlete with control for all anthropometric measurements.

The development of facial hair has been studied by adopting a 5 point maturity scale as suggested by *Reynolds (1951)* on the following basis:

Stage-I : Pigmentation of hair at the corners of the upper lips.

Stage-II : Hair spread medially to complete the moustaches.

Stage-III : Hair appear on the upper part of the cheek and in the midline just below the lower lip.

Stage-IV : Hair spread along the sides and lower border of the chin.

Stage-V : Thickening of hair on moustaches and beard.

All the subjects were classified into various stages of development of facial hair and percentage of each stage was calculated in each age group. On the basis of these percentages, median age of appearance of each stage has been calculated through Probit analysis *(Finney, 1952).*

Results and Discussion

1. Anthropometric measurements:

Table 1. Age changes in weight and stature of athlete and control group boys.

	Age (Yrs)	N	Weight (Kg)		Stature (Cm)	
			M	**SD**	**M**	**SD**
ATHLETES	10	40	27.66	2.63	140.92	3.50
	11	42	29.39	4.11	144.70	5.97
	12	43	31.40	6.43	148.72	6.40
	13	38	37.58	6.48	151.87	7.53
	14	37	42.11	8.73	158.50	9.02
	15	44	47.65	9.02	162.70	8.85
	16	40	50.69	8.85	165.62	8.97
	17	35	52.65	9.70	167.72	6.04
	18	28	55.36	9.84	168.87	9.24
CONTROL	10	44	29.41	4.96	144.73	7.25
	11	38	32.30	4.52	146.63	8.53
	12	39	35.56	5.83	147.93	9.87
	13	40	37.98	7.72	150.43	8.31
	14	41	43.15	8.65	156.30	7.37
	15	38	46.38	7.62	163.95	6.32
	16	40	49.52	8.46	166.81	5.84
	17	42	52.37	8.81	166.29	6.61
	18	28	54.50	6.28	168.20	6.46

Weight: The weight has shown a continuous trend of increase from 10 to 18 years in both athlete and control boys (Table 1). The athletes are lighter in weight than controls up to 14 years with significant differences from 10 to 12 years. From 15 to 18 years of age athletes are heavier although the differences are not statistically significant. The adolescent spurt in weight is earlier in athletes i.e. from 12 to 13 years and of greater magnitude (6.18 kg) than control group boys in whom the spurt has occurred from 13 to 14 years with a magnitude of 5.17 kg. *Singal et al. (1994)* studied intersportive differences in anthropometric measurements of hockey,

boxing, judo, gymnastic athlete and control group boys and also reported lesser weight for athletes as compared to controls and other sports except gymnasts. *Mokha et al. (1988)* also suggested that lesser weight is advantageous to runners as they have to carry their bodies while running. *Sethi and Sidhu (1990)* and *Sidhu et al. (1996)* have reported more weight for sport boys as compared to control group from 11 to 19 years.

Stature: Like weight, the stature has also increased continuously from 10 to 18 years in both athlete and control boys (Table 1). The control boys are taller than athletes up to 16 years followed by slightly more stature in athlete boys from 17 to 18 years with statistically non-significant differences. The adolescent spurt is earlier in athletes i.e. from 13 to 14 years and in controls from 14 to 15 years. Earlier adolescent spurt in athlete

boys reveal that they are advanced biologically and are ahead in the path of maturation leading to slightly more stature at 17 and 18 years of age *Shuck (1962)* reported greater height in junior high school athletes as compared to non-athlete boys. *Clark (1968)* reported that track athletes did not differ in size at upper elementary level (9-12 years) but at junior high level (12-15 year) the track athletes were significantly advanced in height and strength as compared to controls. *Singal et al. (1994)* studied intersportive differences in stature of players ranging in age from 18 to 30 years and reported lesser stature for athletes as compared to boxers, hockey, judo as well as control group and were taller than gymnasts. *Sethi and Sidhu (1990)* and *Sidhu et al. (1996)* reported more stature for sports boys as compared to controls even during growing years.

Table 2. Age changes in diameters of athlete and control group boys.

	Age	N	Biacromial Diameter		Bicristal Diameter		Humerus Bicondylar		Wrist Diameter		Femur Bicondylar		Ankle Diameter	
			M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
ATHLETES	10	40	29.95	1.64	21.87	1.37	4.62	0.49	4.47	0.45	7.32	0.39	5.96	0.26
	11	42	30.73	2.12	22.04	1.49	5.28	0.62	4.61	0.48	7.43	0.52	5.98	0.44
	12	43	31.41	2.39	22.48	1.81	5.96	0.48	4.80	0.47	7.73	0.66	6.14	0.50
	13	38	32.11	2.57	23.05	2.02	5.90	0.68	4.82	0.45	8.13	0.59	6.29	0.52
	14	37	33.53	3.05	24.99	2.22	6.35	0.52	5.09	0.41	8.37	0.65	6.45	0.54
	15	44	35.15	2.57	25.30	2.10	6.48	0.46	5.25	0.45	8.50	0.64	6.58	0.47
	16	40	35.07	2.74	26.06	2.50	6.50	0.42	5.28	0.42	8.52	0.84	6.69	0.45
	17	35	35.86	2.79	26.79	2.85	6.65	0.47	5.49	0.32	8.79	0.53	6.76	0.53
	18	28	36.02	1.84	26.47	1.56	6.71	0.59	5.52	0.44	8.94	0.86	6.85	0.37
CONTROL	10	44	29.62	3.09	20.37	2.13	5.27	0.95	4.51	0.85	7.14	0.82	5.86	0.81
	11	38	30.52	1.79	21.87	1.57	5.57	0.48	4.67	0.53	7.34	0.58	5.90	0.57
	12	39	30.84	3.35	21.70	2.75	5.55	0.59	4.56	0.50	7.38	0.96	5.78	0.52
	13	40	30.64	2.37	21.65	1.64	5.89	0.54	4.79	0.44	7.84	0.52	5.89	0.46
	14	41	37.73	2.91	23.12	2.29	6.12	0.58	5.05	0.48	8.34	0.61	6.27	0.58
	15	38	32.74	1.97	24.94	1.77	6.33	0.60	5.15	0.59	8.50	0.57	6.35	0.60
	16	40	34.01	2.27	24.98	1.64	6.47	0.66	5.17	0.50	8.61	0.73	6.37	0.52
	17	42	34.68	2.38	24.67	2.02	6.38	0.91	5.42	0.77	8.54	0.97	6.53	0.80
	18	28	34.98	1.89	25.13	1.67	6.56	0.97	5.47	0.70	8.77	0.85	6.63	0.80

Diameters: All the diameters– biacromial, bicristal, humerus bicondylar, wrist, femur bicondylar and ankle have shown a trend of increase from 10 to 18 years in both athlete and control boys (Table 2). The athletes possess broader shoulders than controls at all ages with significant differences at 13, 15, 17 and 18 years. The bicristal diameter is also larger in athletes in all age groups with significant differences at 10, 13 and from 16 to 18 years (Table 4). *De Garry et al. (1974)* also reported that male thrower, sprinters and runners possess broader shoulder than controls. *Sodhi and Sidhu (1984)* also found Indian discus, hammer and shot put throwers for having broader shoulders.

Sethi and Sidhu (1990) reported broader shoulders and wider hips in boys from 13 to 18 years and have mentioned that these differences increase during 14 to 16 years. *Sidhu et al. (1996)* also reported that sports boys possess broader shoulders and wider hips than controls with significant differences in some age groups from 11 to 19 years.

Humerus bicondylar wrist, femur bicondylar and ankle diameters are also larger in athletes with significant differences in some age groups (Table 2, 4). *Singh et al. (1992)* reported that sports boys of age range 11-19 years are also ahead in humerus bicondylar and wrist diameters as compared to control boys.

Table 3. Age changes in circumferences and skinfolds of athlete and control group boys.

Age (Yrs)	N	CIRCUMFERENCES (CM)								SKINFOLDS (MM)							
		Head		Chest		Upper arm		Calf		Triceps		Suprailiac		Subscapular		Calf	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
								Athletes									
10	40	51.78	1.77	58.65	4.34	16.94	1.09	24.66	2.30	6.09	1.05	4.95	0.93	7.09	1.08	6.89	0.93
11	42	51.93	1.86	60.98	4.17	17.81	2.12	26.78	2.96	5.98	1.09	5.05	1.00	6.30	1.07	7.13	1.00
12	43	52.35	1.71	63.08	5.07	19.10	2.34	27.13	2.83	5.90	1.48	4.97	1.15	6.28	0.82	6.83	2.16
13	38	53.06	1.59	67.68	6.14	19.86	2.70	27.99	2.95	6.63	1.74	5.13	1.85	6.80	1.81	7.03	2.00
14	37	53.65	1.65	70.86	5.73	21.26	2.56	29.84	3.91	6.95	1.83	5.88	1.72	7.28	1.94	7.40	2.26
15	44	53.59	2.09	74.26	6.07	22.49	3.08	31.03	3.60	5.95	1.43	5.73	2.14	7.60	1.80	7.64	2.57
16	40	53.89	2.10	76.43	5.41	23.27	3.13	30.62	3.38	6.30	1.59	5.38	1.32	7.60	1.05	8.03	1.32
17	35	54.11	1.85	78.70	4.98	23.93	3.12	31.15	4.93	5.63	1.94	5.88	1.21	7.83	1.59	7.93	1.21
18	28	54.30	1.93	80.26	5.56	23.96	3.13	32.86	3.30	5.87	1.80	5.67	1.36	7.93	1.80	7.50	1.36
								Controls									
10	44	51.98	2.33	61.60	2.42	17.91	1.57	24.87	3.05	6.00	1.97	4.75	1.59	6.36	1.06	6.80	2.02
11	38	52.19	2.02	62.52	4.71	18.35	2.10	24.98	2.69	6.25	1.84	5.13	1.55	6.33	0.92	7.13	1.87
12	39	52.76	2.08	62.31	4.49	19.43	4.81	26.83	2.76	6.48	1.76	5.08	2.02	6.30	1.66	7.28	1.86
13	40	52.98	1.91	63.81	5.41	19.98	1.92	26.21	3.91	6.35	2.30	5.23	2.13	6.93	1.82	7.18	2.40
14	41	53.45	2.99	67.80	5.37	22.24	3.86	27.93	3.55	7.13	2.91	6.50	2.22	7.85	2.17	8.05	2.61
15	38	53.96	3.22	68.98	5.02	22.97	2.76	30.29	4.58	6.53	1.76	6.39	1.66	8.28	1.82	8.17	2.17
16	40	54.06	3.80	74.16	5.24	24.20	2.18	30.06	3.19	6.95	2.42	5.80	1.98	8.03	1.06	7.92	2.34
17	42	54.19	1.81	78.68	7.54	25.38	2.72	31.09	2.60	6.48	1.34	5.46	1.26	7.73	1.76	8.07	1.86
18	28	54.18	2.19	79.09	6.36	25.16	2.02	32.33	3.50	7.01	1.82	6.03	1.41	8.08	2.01	8.67	1.41

Circumferences: All the circumferences (head, chest, upper arm and calf) have shown a trend of increase from 10 to 18 years in both athlete and control boys (Table 3). The adolescent spurt has occurred earlier in athletes in all the circumferences except head circumference. The head circumference is slightly more in control boys with

insignificant differences whereas the chest circumference is larger in athlete boys from 12 to 18 years with significant differences from 13 to 15 years. The upper arm circumference is larger in control boys with significant differences at age 10 and 17 years. The calf circumference is larger in athletes from 12 to 18 years with significant differences at 13 and 14 years. The large circumference of calf in athletes is due to more development of lean tissue because the calf skinfold values are larger in control group. *Singh (1992)* reported larger chest and calf circumference in sports boys from age 11 to 19 years than control boys.

Skinfolds: All the skinfolds (triceps, suprailiac, subscapular and calf) have also shown a trend of increase from 10 to 18 years of age in both athlete and control group (Table 3). The athlete boys have lesser value of skinfolds than control boys with significant differences in some age groups (Table 4). The adolescent spurt has occurred earlier in athletes in all skinfolds but the magnitude of increase is more in control boys. *Bhardwaj et al. (1990)* reported that sports persons possess small value of skinfold thickness as compared to controls. *Singh (1992)* also reported in the same direction while working on sports and control boys of 11 to 19 years of age. *Sethi and Sidhu (1995)* studied body composition and skinfold changes in sports boys and controls from 13 to 18 years and reported that the skinfolds become thicker with age and sports boys have shown lesser value of skinfolds at all ages and differences become more at 17 and 18 years.

Table 4. Comparison of athlete and control group boys – Test of significance ('t' test)

					DIAMETERS			
Age	Weight	Stature	Biacromial	Bicristal	Humerus bicondylar	Wrist	Femur bicondylar	Ankle
10	-2.04*	-3.17*	0.62	3.87*	-4.00*	-0.27	1.30	0.77
11	-3.00*	-1.16	0.48	0.50	-2.34*	-0.53	0.73	0.70
12	-3.00*	-0.43	0.88	1.50	3.44*	2.23*	1.90	3.19*
13	-0.49	0.80	2.62*	3.35*	0.07	0.30	2.37*	3.59*
14	-0.53	-1.17	1.18	3.66*	1.87	0.39	0.21	1.41
15	1.78	-0.25	5.44*	0.84	1.26	0.85	0.00	1.91
16	0.60	-0.70	1.88	2.29*	0.24	1.06	-0.51	2.95*
17	0.13	0.99	1.97*	3.69*	1.68	0.53	1.43	1.51
18	0.39	0.32	2.09*	3.10*	1.17	0.30	0.74	1.32

- sign indicates more value in control group, * Statistically significant at 5% level.

	CIRCUMFERENCES			SKINFOLDS			
Age	Chest	Upper arm	Calf	Triceps	Supra-iliac	Subsc-apular	Calf
10	-3.80*	-3.31*	-0.61	0.26	-0.71	3.12*	0.27
11	-1.54	-1.14	-2.87*	-0.89	-0.27	-0.13	0.00
12	0.73	-0.32	0.49	-1.60	-0.30	-0.07	-1.01
13	3.18*	-0.23	2.28*	0.61	-0.22	-0.32	-0.30
14	3.19*	-1.33	2.25*	-0.33	-1.38	-1.22	-1.17
15	4.31*	-0.74	0.80	-1.62	-2.07*	-0.169	-2.92*
16	1.91	-1.54	0.76	-1.42	-1.12	-1.82	0.26
17	0.01	-2.15*	0.06	-2.19*	1.49	0.26	-0.40
18	0.73	-1.70	0.58	-2.35*	-0.97	-0.68	-3.16*

Table 5. Comparison of median ages of development of different stages of facial hair in athlete and control group boys.

STAGE	ATHLETES		CONTROLS		Test of Significance 'T' VALUE
	Median age	+ S.E. of Median age	Median age	+ S.E. of Median age	
I	11.66	0.88	12.49	0.26	-0.91
II	13.52	0.38	14.51	0.30	-2.04*
III	15.49	0.34	16.43	0.19	-2.40*
IV	16.69	0.93	16.73	1.36	-0.02

- sign indicates, early appearance of facial hair in athletes. * Statistically significant at 5% level.

2. *Development of Facial Hair:*

Table 5 presents the median age and standard error of median age of all the four stages of development of facial hair. It is evident from the table that all the stages of facial hair development have shown earlier appearance in athletes with significant differences in stage II and III as compared to control boys (Table 5). The athlete boys when compared with Jat Sikh boys studied by *Bhatnagar et al. (2000)* have shown delayed appearance of all stages except Ist stage but have shown earlier appearance of all stages than Khatri boys reported by *Bajaj (1991).*

References

Bajaj, P.S. 1991. *Physical growth, physiological maturity and body composition in Khatris of Punjab.* Ph.D. thesis (Unpublished), Pbi. Univ., Patiala.

Bharadwaj, H., Zacharrah, T., Singh, I.P., Krishnan, S., Kapoor, S. and Gupta, J.S. 1990. Body composition and body segment volume proportions of Indian athletes and sportsmen. *Ind. J. Sports Sc. and Phys. Edu.,* **2:** 13-23.

Bhatnagar, D.P., Singal, P. and Teka, G. 2000. Development of facial hair in Jat Sikh boys. In: *Advances in Human Biology at the turn of the Millennium,* Publication Bureau, Punjabi University, Patiala, 32-37.

Clarke, H.H. 1968. Characteristics of young athletes: a longitudinal book, kinesiology Review. *Am. Association for Health Physical Education and Recreation.* Washington, DC. 33-42,

deGarray, A.L., Levine, L. and Carter, J.E.L. 1974. In: *Genetic and anthropological studies of Olympic athletes.* Academic Press, New York.

Finney, D.J. 1952. Probit analysis. In: *A statistical treatment of the sigmoid response curves* (2nd Ed.). Cambridge University Press, London.

Malina, R.M. 1977. Physical growth and maturity characteristics of young athletes. In: *Children and youth in sports.* Magill, R.A.; Ash, M.J. and Smoel, F.L. (Eds.) A contemporary Anthropology, Human Kinetic Publishers, Champaign, Illinois.

Mokha, R., Singal, P., Bhatnagar, D.P. and Sidhu, L.S. 1988. Intersportive differences in physique and body composition of female players from Uttar Pradesh. *NIS Scientific Journal*, **11:** 52-58.

Oppliger, R., Clark, B.A., Maylew, I.L. and Haywood, K.M. 1986. Strength, flexibility and body composition differences between age group swimmers and non-swimmers. *Aust. J. Sc. Med. Sports*, **18:** 14-16.

Parizkova, J. 1974. Particulars of lean body mass and fat development in growing boys as related to their motor activity. *Acta Paediatrics. Belg.*, **28:** 233-243.

Reynolds, L. 1951. The appearance of adult patterns of body hair in man. *Ann. N.Y. Acad. Sc.,* **53:** 576.

Sethi, H.K. and Sidhu, L.S. 1990. Growth patterns of junior sports boys in some body measurements. *Ind. J. Sport Sc. and Phys. Edu.*, **2(2):** 81-87.

Sethi, H.K. and Sidhu, L.S. 1995. Body composition and skinfold changes in sports boys and controls from age 13 to 18 years. *Ind. J. Sport Sc. and Phys. Edu.*, **7(1):** 19-28.

Shuck, G.R. 1962 Effects of athletic competition on the growth and development of junior high school boys. *Res. Quarterly*, **33:** 288-298.

Sidhu, L.S, Singh, J., Singh, S.P. and Kaur, G. 1996. Morphological characteristics of sports boys ranging in age from 11 to 19 years. *Ind. J. Sport Sc. and Phys. Edu.*, **8(1):** 37-49.

Singal, P., Bhatnagar, D.P., Maraul, Y.K. and Dhillon, S. 1994 Morphological profile and body composition in various sports of national level men. *Ind. J. Sport Sc. and Phys. Edu.*, **6(1):** 21-31.

Singh, J. 1992. *Determination of age from physiological maturity with special reference to age based competitions in boys.* Ph.D. thesis (unpublished), Pbi. Univ., Patiala.

Sodhi, H.S. and Sidhu, L.S. 1984. In: *Physique and selection of sportsmen – A kinanthropometric study.* Punjab Publishing House, Patiala.

Tanner, J.M., Hiernaux, J. and Jarman, S. 1969. Growth and physique studies. In: *Human Biology – A Guide to Field Methods* (Ed.). J.S. Weiner and J.A. Lourie, Blackwell Scientific Publications, Oxford, I.