

Physical fitness and health status of adolescent girls in relation to socio - economic background

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■ ABSTRACT

The present study was conducted to assess the physical fitness and health status of adolescent girls in relation to socio-economic background. One hundred and eighty girls aged 13-15 years were purposively selected from government and public schools located in Hanumangarh city, Rajasthan. An interview schedule was developed to collect the information regarding background profile and physical activities. For anthropometric measurements, height and weight were measured and Body Mass Index (BMI) was calculated. Physical fitness was assessed by step up test, curl up test and sit and reach test. Results of background information revealed that majority of respondents were Hindu (68.34%) and belonged to OBC (52.77%). Food habits showed that 69.44 per cent subjects were vegetarian while non-vegetarian and eggitarian constituted 26.11 and 4.45 per cent, respectively. Only 55, 43.34 and 41.66 per cent respondents were performing exercise from middle, lower and upper socio-economic class and out of these, 38.09 and 36.90 per cent respondents were participating in yoga and sports activities, respectively. Anthropometric measurements indicated that mean \pm SD of height was highest (157.10 ± 6.69 cm) in the subjects of middle class, whereas the mean weight was found maximum (48.65 ± 6.69 kg) in upper SES class. No significant difference was found between SES groups and cardio respiratory endurance whereas a significant ($p < 0.01$) difference was observed between SES and muscular endurance and between SES and flexibility.

■ **Key Words** : Physical fitness, Health status, Adolescent girls, BMI, SES,

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Adolescence is a crucial period of life, since dramatic physiological and psychological changes take place at these ages as it may constitute the last possible growth spurt (Saris *et al.*, 2003). During this period, there is a gain in 35 per cent of adolescent height and 11-18 per cent of adult height (Das and Bisawas, 2005). Growth of adolescents is considered as a good indicator of health and nutritional status of a community. Appropriate level of exercise combined with a healthy diet can help reduce the risk of various diseases and help to maintain a healthy body weight and composition throughout the life, therefore, physical fitness is a major basis for good health and well-being. Researchers (Moreira *et al.*, 2011) have revealed that

adolescents who have poor physical fitness in all of the health related components are more likely to have a higher risk factor for metabolic syndrome. Physical fitness is the ability to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure time activities and meeting emergency demands and it is a major basis for good health and well-being.

Physical fitness involves the performance of the heart and lungs, and the muscle of the body. The components of physical fitness for health include cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition.

Socio-economic status is an important determinant of

health and well-being. Several factors affect the health status of adolescents. Among these, socio - economic and demographic factors are associated with worldwide patterns of stunting and thinness. The body of evidence linking socio-economic status with health outcomes is large and invariably suggests that higher socio-economic status levels are usually positively associated with health-protective behaviours and negatively associated with health-impeding behaviours (Viswanath and Bond, 2007). Percentage of children from well-off families are reported to have significantly higher BMI ($p < 0.05$) as compared to ones from poor and large families (Babar *et al.*, 2010). However, it may not be true for all the parameters of physical fitness. Since there is dearth of data on physical fitness and health status of adolescent girls in relation to socio-economic background, the present study was undertaken.

■ METHODOLOGY

The study was undertaken in one government and two public schools located in Hanumangarh city of Rajasthan. One hundred and eighty girls aged 13-15 years were purposively selected belonging to lower, middle and upper class with the help of Kuppaswami SES scale updated by Kumar *et al.* (2012) for urban families. From each socio-economic class, 60 girls were selected. An interview schedule was developed and administered to collect the information regarding personal particulars and physical

activity of the respondents. Height and weight were measured using standard techniques and BMI was calculated. The physical fitness of the respondents was assessed using three minute step up test (cardio-respiratory endurance), curl up test (muscular endurance) and sit and reach test (flexibility).

The observations so obtained were statistically analyzed and mean, percentage, standard deviation and Chi-square of significance were calculated.

■ OBSERVATIONS AND DISCUSSION

The results obtained from the analysis of the data of present investigation were organized and presented as under:

Age:

Table 1 shows that total 42.22 per cent respondents were of 13 years of age belonging to different socio-economic status. In this age group, respondents belonging from lower class were 41.66 per cent. In the middle and upper class, respondents were 43.33 per cent and 41.66 per cent, respectively. It shows that distribution of respondents in each income class was almost same (42.22%). In 14 years age group, there were 29.45 per cent respondents. Among this 28.34 per cent, 33.33 per cent and 26.66 per cent belonged to lower, middle and upper class, respectively. Fifteen years girls were almost same as that of 14 years (28.33 %). Thirty per cent girls were from lower class, 23.33 per cent and 31.66 per cent belonged to middle and upper

Table 1 : Percentage distribution of respondents in view of background profile

Sr. No.	Particulars	SES groups			Overall (n=180)
		Lower class (n=60)	Middle class (n=60)	Upper class (n=60)	
1.	Age (years)				
	13	41.66(25)	43.33(26)	41.66 (25)	42.22(76)
	14	28.34(17)	33.33 (20)	26.66 (16)	29.45(53)
	15	30(18)	23.33 (14)	31.66 (19)	28.33(51)
2.	Religion				
	Hindu	83.34(50)	58.33 (35)	63.33(38)	68.34(123)
	Muslim	6.66(4)	8.33(5)	13.33(8)	9.44(17)
	Sikh	10(6)	33.34(20)	23.34(14)	22.22(40)
3.	Caste				
	SC	26.66(16)	16.66(10)	16.66(10)	20(36)
	ST	1.66 (1)	5(3)	8.34(5)	5(9)
	OBC	56.68 (34)	56.68(34)	45(27)	52.77(95)
	General	15(9)	21.66 (13)	30(18)	22.23(40)
4.	Food habits				
	Vegetarian	81.66(49)	65 (39)	61.66 (37)	69.44(125)
	Non vegetarian	10(6)	30 (18)	38.34 (23)	26.11(47)
	Eggitarian	8.34(5)	5 (3)	-	4.45(8)

Values in parenthesis represent number of respondents, SES= Socio-economic status



class, respectively.

Religion:

Perusal of Table 1 depicts that majority of the respondents *i.e.* 68.34 per cent were Hindu irrespective of lower (83.34%), middle (58%) and upper class (63.33%), followed by Sikh respondents (22.22%), whereas only 9.44 per cent respondents belonged to Muslim religion.

Caste:

Information of caste system revealed that maximum subjects belonged to OBC (52.77%). Remaining 22.23, 20 and 5 per cent respondents were from General, SC and ST category, respectively. Similar pattern was observed in middle and upper class however, in the lower class, respondents from schedule caste (SC) were more (26.66%) than that of general category (15%).

Food habits:

Analysis of Table 1 revealed that maximum respondents were vegetarian (69.44%) in each income class. Remaining were non-vegetarian and eggitarian (26.11% and 4.45%, respectively). Percentage of non-vegetarian respondents was more in upper class whereas majority (81.66%) of vegetarians were from lower class.

Physical activities:

The data collected on type, duration and frequency of physical activities have been exhibited in Table 2 and findings

are given below:

Exercise:

As indicated in Table 2, more than half of respondents (53.34 %) were not doing any physical exercise. Respondents who were engaged in some type of physical activity (46.66%) were from middle class (55%), lower class (43.34%) and upper class (41.66%).

Type of exercise:

As far as type of exercise is concerned, 38.09 per cent and 36.90 per cent respondents were participating in yoga and sports activities, respectively. Remaining 15.47 per cent and 9.54 per cent respondents were doing PT or other activities like bicycling and other household activities etc. Further, data also indicated that majority of respondents doing Yoga belonged to upper class (76%). In lower class sports and PT were more common (46.15% and 30.76%) whereas in middle class participation in both sports (39.39%) and Yoga (36.36%) was observed.

Duration of exercise:

Majority of respondents (79.76%) were doing exercise for less than 30 minutes followed by 30-60 minutes (19.05%) and more than 60 minutes (1.19%).

Frequency of doing exercise:

Data revealed that 55.95 and 41.67 per cent respondents were doing exercise daily and weekly, respectively

Table 2 : Percentage distribution of respondents for their indulgence in physical activities

Sr. No.	Particulars	SES groups			Overall (n=180)
		Lower class (n=60)	Middle class (n=60)	Upper class (n=60)	
1.	Exercise				
	Yes	43.34(26)	55(33)	41.66(25)	46.66(84)
	No	56.66(34)	45(27)	58.34(35)	53.34(96)
2.	Type of exercise	n=26	n=33	n=25	N=84
	Sports	46.15(12)	39.39(13)	24(6)	36.90(31)
	Yoga	3.84(1)	36.36(12)	76(19)	38.09(32)
	PT	30.76(8)	15.15(5)	-	15.47(13)
	Any other	19.25(5)	9.10(3)	-	9.54(8)
3.	Duration of exercise	n=26	n=33	n=25	N=84
	<30 minutes	88.46(23)	72.72(24)	80(20)	79.76(67)
	30-60 minutes	11.54(3)	24.25(8)	20(5)	19.05(16)
	>60 minutes	-	3.03 (1)	-	1.19(1)
4.	Frequency of doing exercise	n=26	n=33	n=25	N=84
	Daily	26.92(7)	66.66(22)	72(18)	55.95(47)
	Weekly	73.08(19)	27.28(9)	28(7)	41.67(35)
	Occasionally	-	6.06(2)	-	2.38(2)

Values in parenthesis represent number of respondents , SES= Socio- economic status

irrespective of SES category. In lower class, majority of respondents (73.08%) were doing exercise weekly, whereas maximum respondents from upper class and middle class were engaged in daily exercise (72% and 66.66%), respectively.

Anthropometric measurements:

The physical growth of adolescents, especially that of girls has now been identified as one of the key determinants in vicious life cycle of under nutrition. The period of adolescence contributes to more than 20 per cent of total growth in stature and up to 40-50 per cent body weight with respect to somatic growth. In the present study, height and weight of the subjects belonging to different socio-economic groups were measured and Body Mass Index.

Results of Table 3 revealed that on the basis of mean height, maximum growth was observed in middle class group (157 ± 6.69 cm) while upper class respondents were having maximum mean weight (48.65±6.69 kg). With respect to BMI, both lower (17.88±1.97 kg/m²) and middle class (18.40 ±2.28 kg/m²) respondents were showing value lower than normal *i.e.* >20 kg/ m² where as respondents from upper class were in normal category.

Classification of WHO (2000) for BMI (Fig.1) indicated that about half of the respondents (49.95%) were in category of chronic energy deficiency, being highest (66.66%) in lower class. In low weight category, maximum (25%) respondents were from middle class, whereas in normal category maximum (38.34) respondents were from the upper class. About five per cent respondents fell in overweight category representing upper class (13.33 %) and middle class (3.34%).

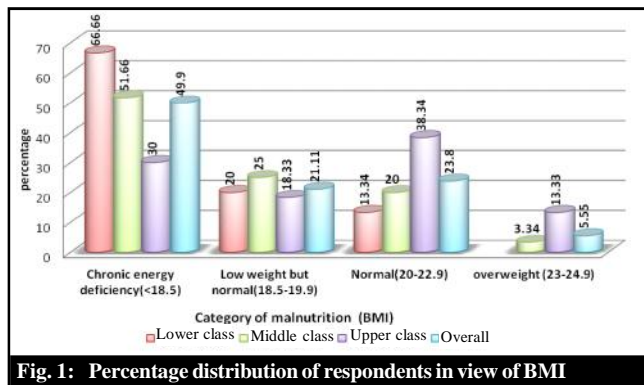


Fig. 1: Percentage distribution of respondents in view of BMI

Physical fitness profile:

Health related physical fitness includes cardio- respiratory, muscular endurance, flexibility and body composition. In the present study, cardio-respiratory endurance, muscular endurance and flexibility were measured by standard techniques to assess the physical fitness of adolescent girls.

Cardio-respiratory endurance:

It is the ability of the body to perform prolonged large muscle, dynamic exercise at moderate to high level of intensity. Table 4 shows the mean ± SD value for fitness index in different SES groups. The maximum fitness index was observed in middle class (79.75±15.71), whereas it was more or less same in lower and upper class subjects.

Classification of subjects based on grading of fitness index suggested by Varghese *et al.* (1994) is shown in Fig.2. Data indicated that more than half of the subjects (55%) in lower class were having poor fitness and rest subjects (45%) were showing low average fitness. In the middle class category 61.66 per cent were having low average

Table 3: Mean ± SD value of anthropometric measurements

SES groups	Lower class		Middle class		Upper class	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Anthropometric measurements						
Height (cm)	154	5.99	157.10	6.69	155.48	6.55
Weight (kg)	42.42	5.13	45.36	7.48	48.65	6.69
BMI (kg/m ²)#	17.88	1.97	18.40	2.28	20.24	2.53

BMI (WHO, 2000), SES= Socio-economic status

Table 4 : Mean ± SD values of physical fitness parameters of subjects

Sr. No.	Physical fitness test	SES groups		
		Lower class	Middle class	Upper class
1.	3 minute step up test			
	Fitness index	73.07±15.47	79.75±15.71	74.39±17.10
2.	Curl up test			
	Maximum numbers of curl ups performed	46±14	48±13	39±17
3.	Sit and reach test			
	Maximum distance covered (cm)	31.77±1.86	30.84±1.68	30.26±1.31

SES= Socio-economic status



fitness index whereas rest 38.33 per cent subjects having poor fitness. More or less similar were the results for the upper class subjects. None of the subjects from any SES category was among good, very good or excellent endurance capacity.

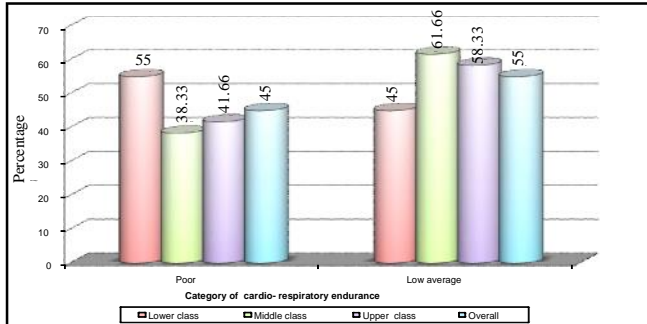


Fig. 2: Percentage distribution of respondents in view of cardio-respiratory endurance

Parallel findings were observed by Vyas (2009) who conducted similar study on rural and urban adolescent girls of Udaipur district. She reported that the mean value of fitness index of urban and rural girls was 63.54 and 76, respectively and none of them belonged to good or excellent fitness level. Similarly study conducted by Panjikkaran and Usha (2005) also revealed that none of the school going adolescent girls (13-15 years) had good or excellent endurance capacity when measured by Harvard’s step up test. However, girls with acceptable haemoglobin level and involved in physical activity showed high average endurance capacity.

The association of SES class with regard to cardio-respiratory endurance was also calculated with the help of Chi square (χ^2) test and presented in Table 5. It shows that no significant association was found between SES and cardio-respiratory endurance in the present study. However, the

findings of Guedes *et al.* (2012) showed that the socio-demographic and behavioural factors associated with the ability of Brazilian school children of meeting the health standards varied according to the fitness test. In the five tests used, girls presented lower chance of meeting the health standards. Age and socio-economic class were negatively associated with the performance in all physical tests. School children aged ≤ 9 years or from families of lowest socio-economic class presented approximately twice the chance of meeting the health standards than those aged ≥ 15 years and from more privileged families, specifically in the push-ups.

Muscular endurance:

It is the ability of muscles or group of muscles. It was assessed by curl up test. Overview of results indicated the mean number of curl ups which were minimum in upper class (39 ± 17) and maximum in middle class subjects (48 ± 13). In the lower class, number of curl ups were 48 ± 14 which were more or less same as that of middle class.

Grading of curl ups (muscular endurance) as shown in Fig. 3 revealed that majority of the respondents (75%) were

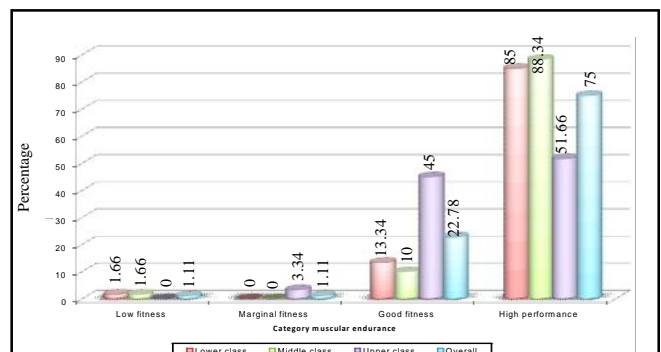


Fig. 3 : Percentage distribution of respondents in view of muscular endurance

Table 5: Association of socio- economic status with cardio-respiratory endurance

Level of physical fitness	SES groups			Overall (n=180)	χ^2 value	P value
	Lower class (n=60)	Middle class (n=60)	Upper class (n=60)			
Poor	33	23	25	81	3.77	.152
Low average	27	37	35	99		(NS)

NS = Non - significant, SES =Socio-economic status

Table 6 : Association of socio - economic status with muscular endurance

Rating of curl up test	SES groups			Overall (n=180)	χ^2 value	P value
	Lower class (n=60)	Middle class (n=60)	Upper class (n=60)			
Low fitness	1	1	-	2		
Marginal fitness	-	-	2	2	31.23	.000
Good fitness	8	6	27	41		(**)
High performance	51	53	31	135		

** indicate significance of value at P=0.01, SES =Socio-economic status

in high performance category and these were 88.3, 85 and 51.66 per cent, respectively in middle class, lower class and upper class. In the good fitness category, there were 22.78 per cent respondents, majority were from upper class. Remaining respondents were having marginal and low fitness (3.34 and 1.11%, respectively).

Statistically significant difference was noted (Table 6) between SES and muscular endurance as determined by Chi square (χ^2) test.

Flexibility:

This denotes the ability to move joints and use muscle through full range of motion. The flexibility of respondents was assessed through the sit and reach test. The data showed that maximum distance covered by the subjects was 31.77 ± 1.86 cm from lower class and minimum was 30.26 ± 1.31 cm by upper class.

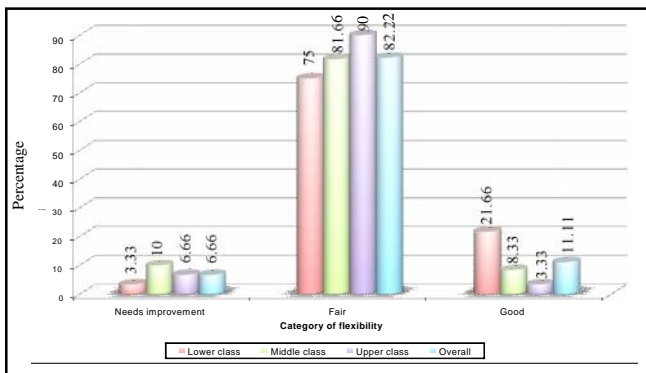


Fig. 4 : Percentage distribution of respondents in view of flexibility

Classification by Canadian Society of Exercise Physiology 1998 for flexibility (Fig. 4) indicated that none of the subject had excellent and very good fitness. However, in the good fitness category, there were 11.11 per cent respondents, majority were from lower class (21.66%). Majority of the subjects (82.22%) in the fair category and these were being highest (90 %) in upper class and lowest (75%) in lower class. Respondents in need improvement category were 6.66 per cent.

The association of SES with flexibility as observed from Chi square (χ^2) test and presented in Table 7 data, showed that a significant difference was found between SES

and flexibility at 5 per cent level of significant.

The finding of the studies conducted by other researchers showed varied results. The relationship between physical activity and health related physical fitness was evaluated in 282 Taiwanese adolescents (12-14 years of age) by Huang and Malina (2002). Physical activity was found significantly and positively correlated with one mile run performance and the sit and reach, but not with sit ups and subcutaneous fatness.

Kaur *et al.* (2007) evaluated the effect of socio-economic status on the physical fitness and growth performance of 327 subjects ranging in age from 11-15 years attending various schools of Patiala (Punjab). Data showed that upper SES girls showed better performance in shuttle run, 50m dash and long jump whereas lower SES girls performed better in case of flexed arm hang. Vyas (2009) also reported that more of rural girls were engaged in exercise and outdoor games as compared to urban girls. The mean fitness index was also found more in rural girls.

Jiménez Pavón *et al.* (2010) examined the influence of socio-economic status on health-related fitness in adolescents. A total of 3,259 adolescents (15.0 ± 1.3 years) from the Healthy Lifestyle in Europe by Nutrition in Adolescence Cross-Sectional Study (HELENA-CSS) participated in the study. Adolescents with high family affluence scale (FAS) had significantly higher fitness levels than their peers of lower FAS categories except for speed-agility and handgrip in boys. Overall, the associations observed presented a medium to large effect size.

Physical work performance as assessed by different tests in the present study showed varied results. This may be due to the fact that factors other than physical activity influence the fitness of adolescents. These factors are both biological and behavioural and are associated with growth, maturation and behavioural development during adolescence. The factors likely to include, among others, individual difference in the timing and tempo of the socio - competence and perceptions of competence in physical activities

Family socio - economic level is a determinant factor that has been reported in the literature to be a modulator of physical fitness indicators. The results of various studies do not permit to clearly identify the direction and magnitude of the association between family socio-

Table 7: Association of socio-economic status with flexibility

Category of physical fitness	SES groups			Overall (n=180)	χ^2 value	P value
	Lower class (n=60)	Middle class (n=60)	Upper class (n=60)			
Needs improvement	2	6	4	12	12.54	0.014 (*)
Fair	45	49	54	148		
Good	13	5	2	20		

* indicate significance of value at P=0.05, SES =Socio-economic status

economic level and physical fitness. In fact, some studies demonstrated a positive association between socio-economic level and physical fitness indicators, whereas a negative association or no association was reported in others. The main reason for these divergent results might be related to the procedures used for the definition of family socio-economic position.

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