NUTRITIONAL STATUS OF ADOLESCENT BOYS

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Abstract

Adolescence is regarded as the period of stress and strain, storm and strike. This is the time when an individual undergoes tremendous changes both physically, emotionally and psychologically. A profound and abrupt change is clearly perceptible into the development of the child who is neither too young nor too old. This sudden growth and development in the child is the unique characteristic of adolescence, an age which requires lots of care, affection, guidance, proper monitoring and motivation. Adolescence can be a time of both disorientation and discovery. The transitional period can bring up issues of independence and self-identity; many adolescents and their peers face tough choices regarding schoolwork, sexuality,drugs, alcohol, and their social life. Peer groups, romantic interests and external appearance tend to naturally increase in importance for some time during a teen's journey toward adulthood. Adolescence comprises nearly half of the growing period in man .With the beginning of adolescence growth rate rises sharply until a peak is reached and it is followed by a decline .One hundred and fifty adolescent boys of 13 to 15 years of age were selected from various govt. schools of district karnal and nutritional status was determined by anthropometric measurements and by clinical examination . Adolescent boys who had higher nutritional status were from educated families who belonged to nuclear family and had high economic status parents as compared to adolescents who had less educated parents, from low economic status and belonging to joint families . Dental caries, signs of vitamin B complex deficiency and night blindness were found to be prevailing nutritional deficiency signs noticed in the adolescent boys.

Keywords: Adolescence, anthropometric measurements, stress, nutritional status, diet

Introduction

Adolescence describes the teenage years between 13 and 19 and can be considered the transitional stage from childhood to adulthood. However, the physical and psychological changes that occur in adolescence can start earlier, during the preteen or "tween" years (ages 9 through 12). It is because of the changes the child undergoes, stress and strain start ensuing. He starts behaving as a grown-up person but at times behaves childishly. There is frequent change in the behavioural act of the child at this stage. There is too much of eagerness as well as restlessness. The hormonal changes have an acute impact on the personality of the child. It results either in pride or shame, overexcitement or humiliation. Pimple and acne formation, genital development and increase in height and weight are the instinctive physical changes. Attraction towards opposite sex, being secretive in nature, group formation and active participation in mature discussion are some of the emotional changes the child undergoes. However indulgence in untoward activities, aggressiveness, emotional imbalance, fickle-mindedness are some of the negative changes in the adolescent that need to be properly eyed. Such features differ from individual to individual in meagre or large.

The period of greatest nutritional need coincides with the peak rate of growth during adolescent are those between 10 and 13 years for girls and 11 and 14 years   for boys (PHSpublication,1973). Anthropometric measurements are the simple measures often used in field studiers by several groups of workers (Jelliffe,1966,:Choudhary and Rao,1984,*et al.*,1986) for evaluating the physical growth . The changes in height and weight are especially remarkable during adolescence. Marked differences are observed in respect of onset as well as magnitude of the growth spurt among the adolescents of the same age and sex .Body growth is directly associated with poor socio-economic status of the family (Krishna *et.al. 1991)* , size and type of the family and literacy level of their family (Bhuiya *et.al* 1986 and Devdas *et al.*,1991).

The present investigation has been undertaken with following objectives:

1. To evaluate the nutritional status of 13 to 15 years   old boys   by   anthropometric measurements and clinical examination. .
2. To find out the association between nutritional status of adolescent boys with literacy level of the parents , their socio-economic status and type of family.

Material and Methods

One hundred and   fifty adolescent boys of 13,14 and 15 years of age were selected randomly from the VIII,1X and Xth standard of different Government schools of district Karnal .Nutritional status of adolescents was evaluated by anthropometric measurements like bodyweight(kg), height(cm), arm circumference(cm),wrist circumference (cm) and triceps skin fold thickness (mm) .All the anthropometric measurements were taken in triplicate for each adolescent and the averages were calculated .Clinical examination was also   carried out to identify the deficiency disorders if any, among the adolescents.

On the basis of anthropometric measurements the Body mass index (BMI) ,Mid arm muscle circumference (MAMC) and Body frame size (BFS) were calculated by using the following formulae (Janner,1963).

a)   BMI   = $\dfrac{\text{Weight (kg)}}{\text{Height (m)}^2}$

b)   MAMC= Mid arm circumference (cm)- (3.14x triceps skin fold thickness)(cm)

c)   BFS   = $\dfrac{\text{Height (cm)}}{\text{Wrist circumference (cm)}}$

The anthropometric measurements of the adolescents were expressed as percent of the standard for the specific age (NNMB,1984).On the basis of the percent standard values adolescents were grouped in to different grades of Nutrition (Keys *et .al.*,1972) ,as normal (>90) ,sub- normal (80 to 90) and below normal (<80) .Association of literacy level of the parent, income level of the family and type of the family with the growth and development of adolescents was also determined .

Results and Discussions

Based on parents education, family income and type of family ,the classification has been made as shown in Table II. Out of the total sample of 150 ,the percent of adolescents belonging to illiterate and literate mothers was 57.4 and 42.7 respectively. But a higher percentage of fathers of adolescents were literate (88.0) than that of being illiterate(12.0). On the basis of annual income

36.0 percent of adolescents came from families falling below poverty line and 64.0 percent boys were found to be from nuclear and 32.6 percent boys were from joint families.

Anthropometric Measurements of Adolescent Boys:

The mean body measurements of adolescent boys 13, 14 and 15 years of age along with standard deviation and standard values are given in Table 1. The values of body weight (kg), height (cm), Arm circumference (cm) and wrist circumference (cm) of the adolescent boys were found to be markedly less than the standard values (NNMB, 1984) for the same age. Even body mass index (BMI) and mid arm muscle circumference (MAMC) values of the adolescents were far below the standards.

Table I : Anthropometric measurements of 13 to 15 year old adolescent boys

S.No	Anthropometric Measurements	Anthropometric measurements of adolescents of different age groups					
		13 years		14 years		15 years	
		Mean±SD	Std*	Mean±SD	Std*	Mean±SD	Std*
1.	Weight (kg)	34.6±6.8	42.4	34.4±6.3	47.3	40.8±7.8	51.1
		(26.0-53.0)		(26.1-48.5)		(27.5-63.8)	
2.	Height (cm)	149.6±8.7	155.0	150.4±7.7	162.5	158.5±7.6	165.5
		(136.0-174.0)		(140.0-169.5)		(140.0-71.2)	
3.	Body mass index	13.6±7.4	17.6	15.0±6.5	17.9	16.4±3.7	18.7
		(13.0-20.0)		(12.0-19.4)		(12.8-21.5)	
4.	Arm circumference (cm)	18.7±4.0	20.8	18.7±2.1	22.0	21.1±5.2	23.0
		(160.0-21.0)		(14.3-23.5)		(13.5-26.4)	
5.	Wrist circumference (cm)	15.9±5.1	18.2	16.2±3.6	19.3	18.4±2.7	21.5
		(13.4-22.9)		(11.8-20.9)		(10.6-26.1)	

❖ Figures in parentheses indicate range

❖ National Nutrition Monitoring Bureau, (1984), National institute of Nutrition ICMR, Hyderabad.

It is evident from the result that the surveyed adolescent boys were shorter and lighter than well to do Indian boys. The result of body measurements also revealed that the rate of growth and physical development of adolescent boys in the present study was slower when compared to the normal healthy adolescent boys.

The effect of literacy level of the parent, income of the family and type of family on the anthropometric measurements like weight, height, and body mass index, mid arm muscle circumference and body frame size of the adolescent boys are given in Table II to Table VI.

Weight: A relatively high per cent of body weight of adolescent boys was noticed with literate mothers (p < 0.01) while the per cent of adolescents with moderate degree of under weight was significantly higher with the illiterate mothers (Table II). The percentage of adolescent boys with normal weight was high in families belonging to the higher economic group (p < 0.01) whereas the percent of adolescents with moderate degree of under weight was relatively more in the families from low economic group. Chi-square test revealed significant association between body weight of adolescents with the literacy level and income of the family but there was no significant association between body weight and type of family.

Table II

Association of literacy level of the parents, family income and type and family with body weight of 13 to 15 years aged adolescent boys

Sr. No.	Particulars	Total No. N = 150	Distribution of adolescents according to per cent of normal weight			
			Moderate <80	Mild 80-90	Normal > 90	Chi-square (X)²
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A.	Literacy level of the parent:					
1.	Mother					
i)	Illiterate	86	62.0	16.0	8.0	18.2
			(72.1)	(18.6)	(9.3)	
ii)	Literate	64	24.0	24.0	16.0	
			(37.5)	(37.5)	(25.0)	
	Z value		(4.46)**	(2.56)**	(11.21)**	
2.	Father					
i)	Illiterate	18	8.0	7.0	3.0	-
			(44.4)	(38.9)	(16.7)	
	Literate	132	78.0	33.0	21.0	
			(59.1)	(25.0)	(15.9)	
	Z value		(1.17)NS	(1.12)NS	(0.08)NS	
B.	Family income Level :					
i)	Below Poverty Line group	54	36.0	13.0	5.0	3.7
	<10000 Rs./Year		(66.7)	(24.0)	(9.3)	
ii)	Above poverty line group	96	50.0	27.0	19.0	
	>10000 Rs/Year		(52.1)	(28.1)	(19.8)	
	Z Value		(1.78*)	(0.55)NS	(13.88)**	
C.	Type of Family :					
i)	Nuclear	101	61.0	27.0	13.0	
			(60.4)	(26.7)	(12.9)	
ii)	Joint	49	25.0	12.0	11.0	1.4
			(51.0)	(26.5)	(22.5)	
	Z value		(1.0) NS	(0.02) NS	(1.40) NS	

(Figures in parentheses indicate percentage)

* Significant at 5 per cent level., ** Significant at 1 per cent level, NS-- Non significant

Height: According to the height of adolescent boys, they were grouped into normal, mild and moderate degrees of malnutrition. Eighty five adolescent boys in this study were found to be normal (Table III). The number of adolescent who were found to be affected with moderate degree of stunted growth was 30. Adolescent boys with normal height were significantly more in the families from high economic status. Similarly in nuclear families adolescents had normal height as compared to their counterparts in joint families. The percentage of adolescents with normal height was markedly high in the families of literate parents. Significant association (P <0.01) of height of adolescents was found with literacy level of mothers, income level of the families and type of family.

Table - III

Association of literacy level of the parents, family income and type and family with the height of 13 to 15 years aged adolescent boys

SNo	Particulars	Total No. N = 150	Distribution of adolescents according to per cent of normal height			
			Moderate <80	Mild 80-90	Normal > 90	Chisquare $(X)^2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A.	Literacy level of the parent:					
1.	Mother					
i)	Illiterate	86	21.0	25.0	40.0	8.2
			(24.4)	(29.1)	(46.5)	
ii)	Literate	64	9.0	10.0	45.0	
			(14.1)	(15.6)	(70.3)	
	Z value		(1.62)*	(2.01)*	(0.30) NS	
2.	Father					
i)	Illiterate	18	8.0	6.0	4.0	-
			(44.4)	(33.3)	(22.2)	
	Literate	132	22.0	29.0	81.0	
			(16.7)	(22.0)	(61.3)	
	Z value		(2.68)**	(0.96)NS	(3.65)**	
B.	Family income Level :					
i)	Below Poverty Line group	54	17.0	15.0	22.0	9.9
	<10000 Rs./Year		(31.5)	(27.8)	(40.7)	
ii)	Above poverty line group	96	13.0	20.0	63.0	
	>10000 Rs/Year		(13.5)	(20.8)	(65.7)	
	Z Value		(2.52)*	(0.92)NS	(3.02)**	
C.	Type of Family :					
i)	Nuclear	101	15.0	16.0	70.0	
			(14.8)	(15.8)	(69.4)	
ii)	Joint	49	15.0	19.0	15.0	20.3
			(30.6)	(38.8)	(30.6)	
	Z value		(2.52)*	(0.92)NS	(3.02)**	

(Figures in parentheses indicate percentage)

*   - Significant at 5 per cent level.

**   - Significant at 1 per cent level.

NS   - Non significant.

Body Mass Index (BMI) : Only 19.7 per cent of adolescent boys of illiterate mothers and 50 per cent adolescent boys of literate mothers were observed to have normal BMI. On the other hand, 53.5 and 20.3 per cent of adolescent boys of illiterate and literate mothers were found to have moderate deficiency of BMI respectively (Table 4). Similar trend was noticed with the educational status of fathers. BMI was normal in 11.1 per cent and it was below normal in 55.6 per cent of adolescent boys from families falling below poverty line. Among those from the above poverty line group the BMI was normal in 44.8 per cent and below normal in 30.2 per cent. More number of adolescent boys of nuclear families (54.6%) had normal BMI than that of joint families (28.5%). Chi-square test revealed a significant association of BMI with the literacy level of mothers, income level of the families and type of family of adolescent boys (p < 0.01).

Table - IV

Association of literacy level of the parents, family income and type and family with the body mass index of 13 to 15 years aged adolescent boys

Sr. No.	Particulars	Total No. N = 150	Distribution of adolescents according to per cent of normal body mass index			
			Moderate <80	Mild 80-90	Normal > 90	Chisquare (X)^2
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A.	Literacy level of the parent:					
1.	Mother					
i)	Illiterate	86	46.0	23.0	17.0	20.4
			(53.5)	(26.8)	(19.7)	
ii)	Literate	64	13.0	19.0	32.0	
			(20.3)	(29.7)	(50.0)	
	Z value		(0.46)NS	(1.51)NS	(2.86)	
2.	Father					
i)	Illiterate	18	8.0	8.0	2.0	
			(44.4)	(44.4)	(11.2)	
	Literate	132	51.0	34.0	47.0	
			(36.6)	(25.8)	(35.6)	
	Z value		(0.46) NS	(1.51) NS	(2.86)*	
B.	Family income Level :					
i)	Below Poverty Line group	-54	30.0	18.0	6.0	18.3
	<10000 Rs./Year		(55.6)	(33.3)	(11.1)	
ii)	Above poverty line group	96	24.0	24.0	48.0	
	>10000 Rs/Year		(25.0)	(25.0)	(50.0)	
	Z Value		(3.08)*	(1.06)NS	(5.07)**	
C.	Type of Family :					
i)	Nuclear	101	43.0	23.0	35.0	
			(42.6)	(22.8)	(34.6)	
ii)	Joint	49	16.0	19.0	14.0	
			(32.7)	(38.8)	(28.5)	
	Z value		(1.29)NS	(1.97)*	(0.76)NS	

(Figures in parentheses indicate percentage)

*   - Significant at 5 per cent level.

**   - Significant at 1 per cent level.

NS   - Not significant.

Mid Arm Muscle Circumference (MAMC): The rationale behind MAMC is that muscle protein constitutes the greatest portion of body protein and a decrease in MAMC reflects the deficiency of protein. Thus MAMC is an index of current protein status in the body. According to MAMC index, only 36 adolescent boys were found to be normal, while the remaining number of 114 showed mild to moderate degree of nutritional status depletion (Table 5). MAMC of adolescent boys was significantly associated with the literacy level of the mother ($p>0.01$) whereas the association was found to be not significant between income level and type of family.

Table - V

Association of literacy level of the parents, family income and type of family with MAMC of 13 to 15 years aged adolescent boys

Sr. No.	Particulars	Total No. N = 150	Distribution of adolescents according to per cent of normal MAMC			
			Moderate <80	Mild 80-90	Normal > 90	Chisquare $(X)^2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
A.	Literacy level of the parent:					
1.	Mother					
i)	Illiterate	86	40.0	20.0	26.0	25.9
			((46.5)	(23.3)	(30.2)	
ii)	Literate	64	14.0	40.0	10.0	
			(21.9)	(62.5)	(15.6)	
	Z value		(3.29)**	(5.19)**	(2.17)*	
2.	Father					
i)	Illiterate	18	3.0	9.0	6.0	
			(16.7)	(50.0)	(33.3)	
	Literate	132	51.09	51.0	30.0	
			(38.7)	(38.7)	(22.6)	
	Z value		(3.00)**	(1.40)NS	(1.44)NS	
B.	Family income Level :					
i)	Below Poverty Line group	54	33.0	17.0	4.0	
	<10000 Rs./Year		(61.1)	(31.5)	(7.40)	
ii)	Above poverty line group	96	21.0	43.0	32.0	
	>10000 Rs/Year		(21.9)	(44.8)	(33.3)	
	Z Value		(4.98)**	(1.64)**	(5.30)**	
C.	Type of Family :					
i)	Nuclear	101	33.0	42.0	26.0	
			(32.7)	(41.6)	(25.7)	
ii)	Joint	49	21.0	18.0	10.0	
			(42.8)	(36.8)	(20.4)	
	Z value		(1.16)NS	(0.56)NS	(0.74)NS	

(Figures in parentheses indicate percentage)

*   - Significant at 5 per cent level.

**   - Significant at 1 per cent level.

NS   - Not significant.

Body Frame Size (BFS) : As shown in Table 6 majority of the adolescent boys were found to be having small body frame size irrespective of their family background.

Table - VI

Association of literacy level of the parents, family income and type and family with body frame size of 13 to 15 years aged adolescent boys

Sr. No.	Particulars	Total No. N = 150	Distribution of adolescents according to per cent of normal body frame size		
			Small	Medium	Large
(1)	(2)	(3)	(4)	(5)	(6)
A.	Literacy level of the parent:				
1.	Mother				
i)	Illiterate	86	62.0	23.0	1.0
			(72.1)	(26.7)	(1.2)
ii)	Literate	64	36.0	24.0	4.0
			(50.3)	(37.5)	(6.2)
	Z value		(2.00)*	(1.40)NS	(1.54)NS
2.	Father				
i)	Illiterate	18	13.0	5.0	-
			(72.2)	(27.8)	(16.7)
	Literate	132	85.0	42.0	5.0
			(64.4)	(31.8)	(3.8)
	Z value		(1.46)NS	(0.35)NS	(2.28)*
B.	Family income Level :				
i)	Below Poverty Line group	54	33.0	20.0	1.0
	<10000 Rs./Year		(61.1)	(37.1)	(1.8)
ii)	Above poverty line group	96	65.0	27.0	4.0
	>10000 Rs/Year		(67.7)	(28.1)	(4.2)
	Z Value		(0.79)NS	(1.11)NS	(0.87)NS
C.	Type of Family :				
i)	Nuclear	101	66.0	30.0	5.0
			(65.3)	(29.7)	(5.0)
ii)	Joint	49	(32.0)	17.0	
			(65.3)	(34.7)	
	Z value		(0.00)NS	(0.61)NS	(2.30)*

(Figures in parentheses indicate percentage)

*   - Significant at 5 per cent level.

**   - Significant at 1 per cent level.

NS   - Not significant.

Clinical examination of adolescent boys: The clinical examination revealed that dental caries was the most common nutritional disorder found in adolescent boys (30.7%). The signs of vitamins B-Complex deficiency noticed included pin and needles ,numbness and angular stomatitis (10.6%). Vitamin 'A' deficiency reflected as night blindness (2.6%). Anemia and muscular cramps due to mineral deficiency were present in 1.3 and 4.0 per cent of adolescent boys respectively (Table VII).

Table - VII

Deficiency disorders in 13 to 15 years aged adolescent boys

Sr. No.	Deficiency disorders	Numbers	Per cent
1.	Anemia	2.0	1.3
2.	Angular Stomatitis	2.0	1.3
3.	Dental Caries	46.0	30.7
4.	Muscular Cramps	6.0	30.7
5.	Night Blindness	4.0	2.6
6.	Pin & Needles Numbness	14.0	9.4
Total		**74.0**	**49.0**

In conclusion, it can be said that more than two third of adolescent boys of the present study had poor physical growth and development and literacy level of the mother, income level of the family and type of family were found to have significant association with the nutritional status of adolescent boys of the present study.

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