

## Original Research Article

# Prevalence of nutritional deficiencies among school going adolescents of Ahmedabad city, Gujarat: a cross sectional study

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## ABSTRACT

**Background:** Adolescence and young adulthood are periods of critical development and transition. Adolescent constitutes over 23% of the population in India. Nutrition and health needs of the adolescent are more because of more requirements for growth spurt and increase in physical activity. Objective of the study was to study prevalence of nutritional deficiencies among school going adolescents of Ahmedabad city, Gujarat.

**Methods:** The study was carried by Community Medicine Department, GMERS Medical College, Dharpur-Patan during period from September 2014 to July 2015. After taking the permission of principals of 9 schools and consent of the parents of adolescents, 842 adolescents from 10 schools of Ahmedabad city were examined for signs of various nutritional deficiencies. The data was collected by predesign, pretested proforma and analyzed using SPSS 17.0 (trial version).

**Results:** Out of total 842 adolescents 409 (48.6%) were female. Mean age of the study adolescents was  $15.8 \pm 1.96$  years. Maximum numbers of the adolescents were in the age group of 10-14 years (60.5%). Mean age of female and male adolescents was  $15.3 \pm 1.89$  years and  $15.9 \pm 2.02$  years respectively. The study revealed that vitamin A deficiency was present in 59 (7.0%) children. Vitamin B complex deficiency signs were seen in 195 (23.2%) children. Vitamin C deficiency signs were seen in 88 (10.5%) children. PEM was observed in 111 (13.2%) children. Essential fatty acid deficiency was observed in 121 (14.4%) children.

**Conclusions:** High prevalence of nutritional deficiencies among these adolescents needs great attention and health education.

**Keywords:** Adolescents health, Nutritional deficiencies, PEM, School health, Vitamin deficiencies

## INTRODUCTION

Adolescence and young adulthood are periods of critical development and transition. In terms of age, It is period of life that is extended from 10-19 years which includes pubertal development also. These young people undergo major physical, cognitive, and psychosocial changes. These changes have important implications for health. As

young people become increasingly independent, they face significant choices in areas such as diet, substance use, sexuality, physical activity and use of health care services. These choices are shaped by individual, family, social environments, and other contextual factors. A school is a key location for educating adolescents about health, hygiene and nutrition, and for putting in place interventions to promote the health of adolescents. At the

same time, poor health, poor nutrition and disability can be barriers to attending school and to learning. Schools are sacred because they provide an environment, for learning skills, and for development of intelligence that can be utilized by students to achieve their goals in life. It is also observed that “to learn effectively, adolescents need good health.” Health is key factor in school entry, as well as continued participation and attainment in school.<sup>1</sup>

The school is also potentially a location for contracting infections or diseases. Finally, childhood health behavior habits such as diet and physical activity are influenced by the school setting and often track into adulthood.<sup>1</sup> The common morbidities found in school age children are nutritional deficiencies, dental, visual and hearing problems, respiratory infections, skin conditions, loco motor disabilities and congenital heart and other problems. The fact is that the most of these conditions are preventable or avoidable and curable especially in early stages by promotion of hygienic practices among school children through proper health education by teachers, who are the first contacts.<sup>2</sup>

Adolescent constitutes over 23% of the population in India. Nutrition and health needs of the adolescent are more because of more requirements for growth spurt and increase in physical activity. Adolescent need more of all nutrient.<sup>3</sup> This study is a humble effort to throw light on prevalence of nutritional deficiencies among school going adolescents.

## METHODS

The study was carried by Community Medicine Department, GMERS Medical College, Dharpur-Patan during period from September 2014 to July 2015. 9 schools were selected by purposive sampling. After taking the permission of principals of schools and informed written consent of the parents of adolescents, 842 adolescents from these schools of Ahmedabad City were examined using pre-designed, pre-tested, semi-structured WHO standard with ICMR modifications questionnaire for nutritional deficiencies. Performa contained general information, anthropometry and general health check-up of the adolescents. The modification included deletion of columns irrelevant to the present study and addition of some columns to record other health abnormalities specially which are common in adolescents. Data were analysed using SPSS version 17 (trial version). Parameters such as rate, ratio and percentages were calculated. In order to have valid interpretation of rates, 95% confidence intervals (CI) were calculated. To test the significance of the difference among the statistical parameters in different subsets of population, suitable statistical tests were applied.

## RESULTS

Out of total 842 adolescents 409 (48.6%) were female. Mean age of the study adolescents was  $15.8 \pm 1.96$  years.

Maximum numbers of the adolescents were in the age group of 10-14 years (60.5%). Mean age of female and male adolescents was  $15.3 \pm 1.89$  years and  $15.9 \pm 2.02$  years respectively. Vitamin A deficiency was present in total 59 (7.0%) children. 28 (6.8%) were females and 31 (7.5%) were males. The signs of vitamin A deficiency and gender was not significantly associated ( $p > 0.05$ ). Other signs of vitamin A deficiency such as Bitot's spot, corneal xerosis and corneal opacities were not observed in any children (Table 1).

**Table 1: Vitamin A deficiency.**

Signs	Gender		Total (842)
	Female (409)	Male (433)	
Conjunctival xerosis	22 (5.3)	24 (5.5)	46 (5.5)
Night blindness	6 (1.4)	5 (1.1)	11 (1.3)
<b>Total conditions</b>	<b>28 (6.8)</b>	<b>31 (7.5)</b>	<b>59 (7.0)</b>

Chi- square: 0.16; Degrees of freedom: 1;  $p = 0.68$

Table 2 shows signs of vitamin B complex deficiency. Signs were seen in total 195 (23.2%) children. 81 (19.8%) were females and 114 (26.3%) were males. Many children have multiple signs of vitamin B complex deficiency. Signs such as angular stomatitis (Female: 2.9% Male: 4.8%;  $p < 0.05$ ) and geographic tongue (Female: 2.2% Male: 5.3%  $p < 0.05$ ) were significantly more observed in males than in females. The signs of vitamin B complex deficiency and gender was not significantly associated ( $p > 0.05$ ).

**Table 2: Vitamin B complex deficiency.**

Signs	Gender		Total (842)
	Female (409)	Male (433)	
Nasolabial dyssebacea	5 (1.2)	4 (0.9)	9 (1.1)
Angular stomatitis	12 (2.9)	21 (4.8)	33 (3.9)
Cheilosis	34 (8.3)	41 (9.5)	75 (8.9)
Red and raw tongue	6 (1.5)	7 (1.6)	13 (1.5)
Geographic tongue	9 (2.2)	23 (5.3)	32 (3.8)
Pellagrous dermatosis	15 (3.7)	18 (4.2)	33 (3.9)
<b>Total conditions</b>	<b>81 (19.8)</b>	<b>114 (26.3)</b>	<b>195 (23.2)</b>

Chi- square: 4.23; Degrees of freedom: 5;  $p = 0.5168$

**Table 3: Vitamin C deficiency.**

Signs	Gender		Total (842)
	Female (409)	Male (433)	
Spongy bleeding gums	28 (6.8)	37 (8.5)	65 (7.7)
petechiae	14 (3.4)	9 (2.1)	23 (2.7)
<b>Total conditions</b>	<b>42 (10.3)</b>	<b>46 (10.6)</b>	<b>88 (10.5)</b>

Chi- square: 2.156; Degrees of freedom: 1;  $p = 0.1420$

Vitamin C deficiency signs were seen in total 88 (10.5%) children. The prevalence rates in males and the females were 10.3% (42 children) and 10.6% (46 children) respectively. The signs of vitamin C deficiency and gender was not significantly associated ( $p>0.05$ ) (Table 3).

Protein energy malnutrition was observed in total 111 (13.2%) children. 53 (13.0%) were females and 58 (13.4%) were males. Many children have multiple signs of protein energy malnutrition. The signs of protein energy malnutrition and gender was significantly associated ( $p<0.001$ ). Thin and sparse hair was more common in girls and lack of lustre of hair was more common in boys (Table 4).

**Table 4: Protein energy malnutrition.**

Signs	Gender		Total (842)
	Female (409)	Male (433)	
Flag sign on hair	5 (1.2)	9 (2.1)	14 (1.7)
Lack of lustre of hair	16 (3.9)	36 (8.3)	52 (6.2)
Thin and sparse hair	32 (7.8)	13 (3.0)	45 (5.3)
<b>Total conditions</b>	<b>53 (13.0)</b>	<b>58 (13.4)</b>	<b>111 (13.2)</b>

Chi-square: 16.66; degrees of freedom: 2;  $p<0.001$

Essential fatty acid deficiency in the form of phrynoderma was observed in total 121 (14.4%) children. Prevalence was more observed in males (68, 15.7%) than in females (53, 13.0%). Prevalence of essential fatty acid deficiency and gender was not significantly associated ( $p>0.05$ ) (Table 5).

**Table 5: Essential fatty acid deficiency.**

Signs	Gender		Total (842)
	Female (409)	Male (433)	
Phrynoderma	53 (13.0)	68 (15.7)	121 (14.4)
<b>Total conditions</b>	<b>53</b>	<b>68</b>	<b>121</b>

## DISCUSSION

In Thakor N et al age of the study children (total 867) ranged from 5-19 years. Mean age was  $13.80\pm1.96$  years. Out of 867, 434 (49.9%) were boys and 433 (50.1%) were girls. The study revealed that vitamin A deficiency was present in 54 (6.2%) children. Vitamin B complex deficiency signs were seen in 179 (20.6%) children. Vitamin C deficiency signs were seen in 86 (9.9%) children. PEM was observed in 77 (8.9%) children. Essential fatty acid deficiency was observed in 123 (14.1%) children.<sup>1</sup>

In Srinivasan K et al 61.4% adolescents were in the age group of 10-14 years, 84.3% adolescents had one or more morbid conditions, 29.9% children had skin disorders.<sup>4</sup>

In Panda P et al 59.5% are boys and 40.5% are girls, 47.8% of children were found to be normal as per their weight for age, 52.2% were malnourished. 28.4% children had mild, 17.0% had moderate and 6.8% children had severe degree of malnourishment, 5.6% children had refractive errors.<sup>5</sup>

In Soumya Deb et al, 40.8 % boys and 25.93% girls were underweight, 76% of boys and 74% of girls were suffering from one or more morbidities.<sup>6</sup>

In Chandna S et al children had night blindness in 35.9%, xerosis conjunctiva in 9.2%, Bitot's spots in 14.2%, nasolabial dyssebacea in 6.8%, angular stomatitis in 6.8%, cheilosis in 8.7% red and raw tongue in 1.6%, pellagrous dermatosis in 13.3%, bleeding gums in 15.2%, ecchymoses in 6.1%, lack of lustre of hair in 26.5%, thinness and sparseness of hair in 24.3%, prevalence of anaemia in children was 34%, 15.9% children had phrynoderma.<sup>7</sup>

In Rema N et al prevalence of vitamin A deficiency in boys was 5.65% and in girls was 8.64%.<sup>8</sup>

As per DLHS (2002-2004), In India 6-7% adolescents aged 10-14 years have problem with their eye sight.<sup>9</sup>

However, study done in 9 schools of Ahmedabad city limits us to generalize the results. There is definitely a need for well-planned, large-scale studies using standardized methodologies to estimate prevalence of nutritional deficiencies among adolescents.

When planning these studies it is necessary to ensure that importance is given to accurate evaluation of socio economic status and representation of the different regions of India. A comprehensive study including anthropometric data, biochemical data, clinical signs of anaemia and dietary intake data among the same group of adolescents will give a better insight into the situation.

## CONCLUSION

High prevalence of nutritional deficiencies among adolescents needs great attention and health education. There is definitely a need for well-planned, large-scale studies using standardized methodologies to estimate the prevalence of nutritional deficiencies among adolescents.

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