

## FRUIT & NUTRIENT INTAKE IN RELATION TO ANEMIA PREVALENCE IN ADOLESCENTS

Swiny Sandhvi<sup>1</sup> and Mukul Sinha<sup>2</sup>

Department of Food & Nutrition, College of Home Science,  
Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar-848125  
E-mails: <sup>1</sup>swinysandhvi@gmail.com <sup>2</sup>sinhamukul24@gmail.com

**Abstract:** Bihar is the third largest producer of vegetables & fourth largest producer of fruits in the Country. It is the largest producer of Litchi, Makhana, Guava, Lady's finger in India. but its agricultural productivity is one of the lowest in the country, leading to rural poverty, low nutrition & migration of labour. This is why the percentage prevalence of anaemic population in rural area is more. Though fruits & vegetables contain vitamins & minerals that offer protection from being anaemic but the recommended per day intake of fruits and vegetables by WHO (400gm) may not be available to the people in growing stage like adolescence.

It is not only girl's adolescent population that are the victims of low nutrient intake but even percentage boys of this age group also suffer from anaemia. Anaemia is a long standing problem in India and the country has a high prevalence of anaemia amongst adolescents. Data from National Nutrition Monitoring Bureau (NNMB), Indian Council of Medical Research (ICMR) and District Level Household Survey (DLHS) surveys have shown that prevalence of anaemia is very high (ranging between 80->90%) in preschool children, pregnant and lactating women and adolescent girls. Low birth weight infants, young children and women of childbearing age are particularly at risk of anaemia. Therefore the present study was conducted in Pusa block of Samastipur district with an objective to find out relationship between fruit and nutrient intake by the adolescents & their haemoglobin level.

**Keywords:** Adolescent, Anemia, Nutrient intake, Fruit, Hemoglobin.

### Introduction

Adolescence is an important developmental life stage characterized by high nutrient requirements to meet rapid growth. Dietary habits established during adolescence may also persist into adulthood and thus much emphasis has been placed on improving dietary habits at a young age.

Anaemia is a long standing problem in India and the country has a high prevalence of anaemia amongst adolescents. According to a National Family Health Survey-3<sup>rd</sup> round (India report-2005) anaemia affects an estimated 50 percent of the Indian population. According to National consultation on control of nutritional anemia in India, the anemia is defined as the hemoglobin of less than 12 g/dl in females. Mild anemia is defined as

*Received Dec 24, 2016 \* Published Feb 2, 2017 \* [www.ijset.net](http://www.ijset.net)*

hemoglobin level of 10-11.9 g/dl, moderate anemia as haemoglobin level of 7-9.9 g/dl and severe anemia was defined as hemoglobin level of less than 7g/dl among females. More than 39 percent adolescent girls in the age group of 15-19 years are mildly anaemic while 15 percent and 2 percent suffer from moderate and severe anaemia respectively (NCCNAI). India also displays very glaring gender disparities. While 30 percent of boys between the ages of 15-19yrs are anaemic, 56 percent girls in the same age group suffered from the this condition.

Fruits and Vegetables contain essential vitamins, minerals and fibers that offers protection from chronic diseases. Low fruit and vegetable intake is considered as the 6<sup>th</sup> main risk factor for mortality in the world. Fruit and vegetable consumption in particular has received less attention. Increased fruits and vegetables consumption can help protect overall health status and reduce both disease risk and burden. Fruit and vegetable intake among children is of particular interest due to growing recognition of the importance of nutrition for growth, development and prevention of chronic diseases such as cardiovascular disease and obesity. Therefore present study is aimed at the fruit and nutrient intake in relation to prevalence of anaemia in the private and Government school adolescent students of Pusa block of Samastipur district (Bihar).

### **Material & Method**

Two private and Two Government Schools of Samastipur district of Bihar was selected. A sample of 120 adolescent students (60 each from private and government schools) were selected. General information presented in Table 1 with regards to age, sex, family size & income, caste, religion & religion was collected from both private and government school adolescents. Their age ranged between 13 to 16 yrs, majority of their family size was between 5-7 members & income wise majority of their family income ranged between 20,000-40,000/M. caste wise too both the private and government school students belonged to general category as majority. To measure the consumption of fruit and nutrient intake a questionnaire was developed. Direct interview method was adopted to collect relevant information from the respondent. The data have been represented in mean, SD and correlation.

### **Result & Discussion**

This table inferred that majority of the adolescent i.e., 41.6 percent and 38.4 percent from government and private school were of the age of 14 years followed by 33.4 percent and 26.6 percent of 15 years age group adolescent of government and private school. The table 1

further showed that 20 and 30 percent of adolescent from government and private school were of 13 years and 5 percent were of 16 years.

Table 1 also showed that 50 percent of adolescents from both the government and private schools were studying in VIII<sup>th</sup> and IX<sup>th</sup> class. Table 1 further revealed that majority of the adolescents i.e., 63.3 percent from government school and 66.6 percent from private school were non-vegetarian followed by 16.6 percent and 30 percent lacto-vegetarian from government and private school. The vegetarian from government school constitute 18.3 percent and from private school 1.6 percent. The Ovo-vegetarian both from government and private school constituted 1.6 percent.

Table 1 reflected that the family size of 1-4 members, in government and private schools were 20 percent and 28.3 percent respectively. Students belonging to 5-7 family members were 63.3 percent in government school and 53.3 in private school. Family size, >7<10 were found 15 percent in each private government school adolescent. The government and private school adolescent of family size 10 and > constituted 1.6 percent and 3.3 percent respectively.

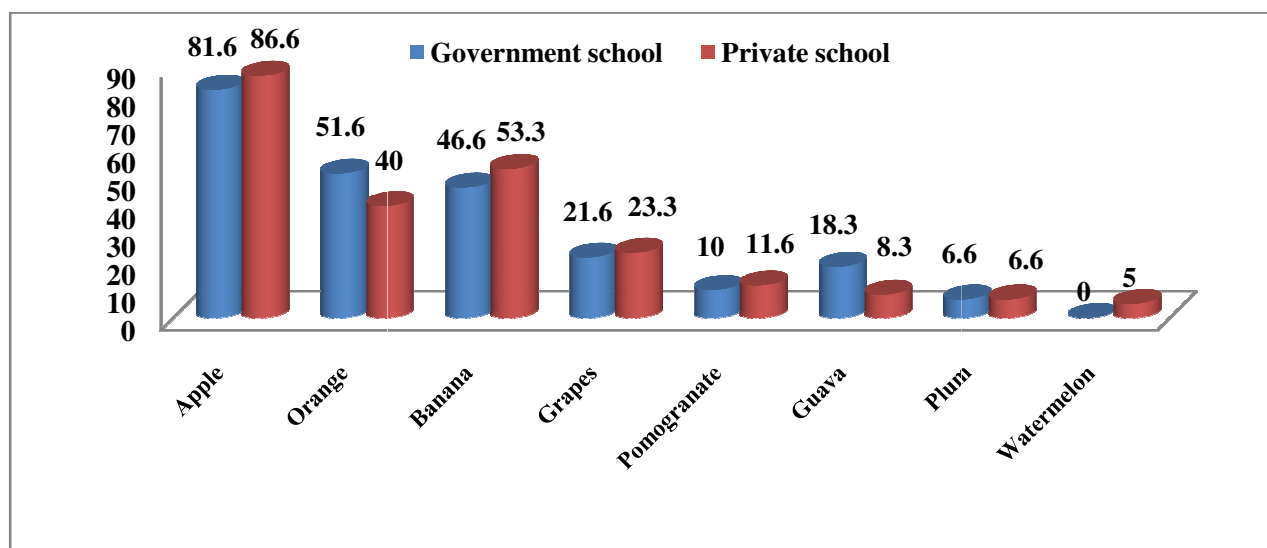
Table 1 also inferred that in government and private school, 51 percent and 65 percent of subjects belonged to forward cast, whereas 36.6 percent and 26.6 percent of subjects belonged to backward caste followed by 11.6 and 8 percent of subjects from schedule cast.

### **Family Income**

Table 1 indicates that majority of the government school students i.e., 53.3 percent and private school students i.e., 61 percent had family income between Rs. (>20,000-40,000) per months followed by 25 percent of government and 10 percent of private school students had family income Rs. (<20,000) per month, 10 percent of government and 15 percent of private school students having family income Rs. (>40,000-60,000) per months, 8.3 percent of government and 6.6 percent of private school students having family income Rs. (>60,000-80,000) per months and 3.3 percent both from government and private school students having family income Rs. (80,000 and above) per months.

**Table 1. General information of the subjects**

Particulars	(N=120)			
	Government school students (60)		Private school students (60)	
	Frequency	Percentage	Frequency	Percentage
<b>A.Age(years)</b>				
13	12	20	18	30
14	25	41.6	23	38.4
15	20	33.4	16	26.6
16	3	5.0	3	5.0
<b>B. Education</b>				
8 <sup>th</sup>	30	50	30	50
9 <sup>th</sup>	30	50	30	50
<b>C.Food habits</b>				
Vegetarian	11	18.3	1	1.6
Non-vegetarian	38	63.3	40	66.6
Ovo-vegetarian	1	1.6	1	1.6
Lacto-vegetarian	10	16.6	18	30
<b>D.Family size</b>				
1-4	12	20	17	28.3
5-7	38	63.3	32	53.3
>7<10	9	15	9	15
10 &>	1	1.6	2	3.3
<b>E.Caste</b>				
General	31	51.6	39	65
BC	22	36.6	16	26.6
SC	7	11.6	5	8.
<b>F.Income(Rs)</b>				
5,000-20,000	15	25	6	10
> 20,000-40,000	32	53.3	37	61
> 40,000-60,000	6	10	9	15
> 60,000-80,000	5	8.3	4	6.6
81,000& above	2	3.3	2	3.3



**Fig.1. Fruits intake of government and private school adolescents (gm/day)**

As regards nutrient intake from whole day diet conversion method Table no.2 both the school students were consuming less energy, protein & calcium when composed to RDA of ICMR. Through iron intake was nearer to RDA. Daily fruit intake has been presented in fig1. When haemoglobin level was composed between the two school students' it was observed that those private school students consuming more of fruits were having better haemoglobin level than government school students whose fruit intake was less.

**Table 2. Nutrient intake by Subjects.**

Particulars	(N=120)		
	Government school (60)	Private school(60)	
	Mean±SD	Mean±SD	RDA* (ICMR)
Energy(kcal)	1571.47±235.71	1605.45±227.57	2302
Protein(gm)	43.5±7.99	45.17±9.8	69
Fat(gm)	42.39±12.5	46.79±10.16	22
Iron (mg)	28.9±9.51	30.40±6.94	37
Calcium (mg)	340.72±116.13	369.04±112.68	550

\* Recommended Dietary Allowances (ICMR, Gopalan *et al.*1989)

Table 2 represents the Nutrients intake of subjects of government & private school

### **Energy (Kcal )**

As compared to R.D.A of energy (2302kcal), the calorie intake by the subjects of government school were (1571.47±235.71 Kcal) and private school subjects were (1605.45±227.57 kcal).

**Protein (g)**

As compared to R.D.A of energy (69g), the protein intake by the subjects of the government school was (43.55±7.99 g) and by private school was (45.17±9.8 g).

**Fat (g)**

As compared to R.D.A of fat (22g), the fat intake by the subjects of the government school was (42.39±12.5g) and private school was (46.79±10.16 g).

**Iron (mg)**

As compared to R.D.A of iron (37mg), the iron intake by the subjects of the government school was (28.9±9.51mg) and private school was (30.40±6.94 mg).

**Calcium (mg)**

As compared to R.D.A of calcium (550mg), the calcium intake by subjects of the government school was (340.72±116.13 mg) and private school was (369.04±112.68 mg).

**Table 3. Haemoglobin level of subjects.**

	<b>Government school</b>	<b>Private school</b>
<b>A. Haemoglobin</b>		
6-8g/dl	20	0
8-10g/dl	26.6	20
10-12g/dl	33.3	46.6
12-16g/dl	20	33.3

Table 3. describes that the Haemoglobin level of 46.6 percent subjects from the private school and 33.3 percent subjects from the government school ranged between 10-12g/dl followed of 20 percent from private school and 26.6 percent government school the range 8-10g.dl, 33.3 percent and 20 percent subjects from private and government school within the range of 12-16g/dl and 20 percent subjects from government school in the range of 6-8g/dl. WHO has suggested that the level of Haemoglobin below which anemia is said to be present is below 12 g/dl for adolescent. The table showed that the lowest haemoglobin range i.e., 6-8g/dl is found more among the government school adolescent (20%). Hence they are more suffering from anemia.

The table inferred that the hemoglobin level of private school adolescent were better than the government school adolescent. This may be attributed due to the fact that the iron intake of private school adolescent are better than the government school adolescent.

**Table 4: Clinical status of the subjects (present)**

Parameters	(N=120)			
	Government school (60)		Private school(60)	
	Frequency	Percentage	Frequency	Percentage
<b>Diseases</b>				
Night blindness	-	-	1	1.6
Cheilosis	3	5	1	1.6
Dry skin	2	3.3	-	-
Bleeding gums	2	3.3	5	8.3
Pain & sensation in legs	8	13.3	6	10

Table 4 showed that the adolescents were suffering from Vitamins deficiency disease in government and private school. It is clear from table that pain & sensation in legs of government school students was 13.3 percent and in private school adolescent was 10 percent. Bleeding gum was 3.3 and 8.3 percent in governments and private school students. Cheilosis was 5 and 1.6 percent in government and private school students. Dry skin was 3.3 percent in government school. No case of dry skin was found among the private school adolescent. Night blindness was 1.6 percent in private school students.

Moreover majority of those who were anaemic had pain & sensation in their legs too. A positive & significant correlation was found between protein & iron intake with haemoglobin level of the subjects. Table 5.inferred that the correlation coefficient between haemoglobin level of adolescent and protein intake was positive and significant at 5 percent level. The correlation coefficient between iron and adolescent haemoglobin level was positive and highly significant at 1 percent level. The finding were supported by Yadav N. *et.al.*, (2014).

**Table 5. Correlation coefficient between Protein and iron with haemoglobin level**

	(Haemoglobin)
Protein	0.595*
Iron	0.715**

\*Correlation is significant at the 0.05 level.

\*\*Correlation is significant at the 0.01 level.

### Conclusion

This study showed that the fruit and nutrient intake of private school adolescent is better and hence their haemoglobin level is better than the government school adolescents. This may be

attributed due to the fact that the socio economic status of private school adolescent were better than government school. Hence they were capable of giving their children more fruits and nutritious food to eat. This study infers that fruit consumption habit is not common in adolescent students, whether of better socioeconomic status or poor. Therefore need is to make parents aware about importance of fruit consumption in development of their adolescent kinds for maintain a healthy body.

### References

- [1] Basu S, Basu S, Hazarika R, Parmar V. (2005). Prevalence of anemia among school going adolescents of Chandigarh. *Indian Pediatr.*42:593-7.
- [2] Bodor, J.N., Rose, D., Farley, T.A., Swalm, C., and Scott, S.K. (2007). Neighbourhood fruit and vegetable availability and consumption: the role of small food stores in an urban environment. *Public Health Nutr.* Vol.11(4): 413-420.
- [3] Blanchette, L., and Brug, J. (2005). Determinants of fruit and vegetable consumption among 6-12-year- old children and effective interventions to increase consumption. *J Hum Nutr Diet.*Vol.18(6): 431-443.
- [4] Indian Council of Medical Research, (2004) Micronutrient Profile of Indian Population, New Delhi.
- [5] National consultation on control of nutritional anemia in India.(NCCNAI) (1998). Department of Family Welfare (Maternal Health Division), Ministry of Health and Family Welfare, Nirman Bhawan, New Delhi..
- [6] National Nutrition Monitoring Bureau.(2002) NNMB Micronutrient Survey. National Institute of Nutrition, Hyderabad.
- [7] New, S.A. (2003). Intake of Fruit & Vegetable: Implications for bone health, *proc. nutrsoc.* Vol.62:889-899.
- [8] Seshadri, S. (1999). Department of Foods and Nutrition. WHO Collaborating Centre for Nutrition Research. The Maharaja Sayajirao University of Baroda, Vadodara, India.
- [9] WHO. (2014). WHO calls for stronger focus on adolescent health.
- [10] Yadav, Nirdhan, Patil, B., B, Anuradha., Kasturi, Hunsatti., Prasad, Sah., and Prasad Jitendra. (2014). Assessment of Hemoglobin, Iron, and Copper in adolescents of Urban school. *Asian Journal of Multidisciplinary Studies.* ISSN:2321-8819.Vol. 2(8).