International Journal of Food Science and Nutrition
ISSN: 2455-4898; Impact Factor: RJIF 5.14
Received: 25-06-2020; Accepted: 10-07-2020; Published: 26-07-2020
www.foodsciencejournal.com
Volume 5; Issue 4; 2020; Page No. 59-62

Food consumption pattern of primary school children aged 10-12 years residing in rural and Urban Areas of Bikaner District (Rajasthan)

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Abstract
Food consumption pattern fundamentally reflects nutrition well beung of individuals and meal pattern is defined by the culture and food availability. The cereals intake of 10-12-year-old rural and urban boys and girls was found to 203.12 & 205.07, 190.71 & 183.45, against 330 g& 270g suggested intake, indicating 61.55 & 62.14, 70.63 & 67.95 per cent adequacy completely. The difference in the cereal intake of rural and urban subjects of both the groups was noted to be significant at 5 per cent level of significance. The pulses intake of 10-12 years old rural and urban boy and girl subjects was found to be the per cent adequacy of pulse intake was found to be, 33.73 to 38.66 and 39.35 to 36.24 per cent respectively against 60g suggested intake per day. Table 1 & 2 clearly indicates that urban subjects had better pulses intake than their rural counterparts. Mean pulse intake of urban subjects was noted to be significantly higher ($p< 0.01$) than their rural counterparts. The suggested intake of green leafy vegetables for 10-12 years old boys and girls is 100 gm per day. But rural and urban boys and girls were having only 15.86 &13.40 & 13.77, 11.67, per cent adequacy for their green leafy vegetables intake. The difference in the green leafy vegetable intake of rural and urban subjects of both the groups was noted to be significant at 1 per cent level of significance The root and tuber intake of 10-12 year old boy and girl subjects rural and urban subjects represented 35.65&34.32, 32.74 &30.68 per cent adequacy for roots and tubers intake. The 10-12 years old boy and girl subjects from rural and urban areas indicated 40.28 & 28.95 per cent and 36.09 & 30.34 per cent adequacy for the consumption of other vegetables. Mean other vegetable intakes of urban subjects were noted to be significantly higher ($p<0.01$) than their counterparts. Per cent adequacy of fruit consumption for 10-12 years of age group for rural and urban boy and girl subjects ranged from 53.72 & 46.30, 38.19 & 34.90, per cent respectively. The difference in the fruit's intake of rural and urban subjects of both the subjects was noted to be significant at 1 per cent level of significance. Boys of 10-12 years age group from rural and urban areas showed 203.24 & 194.38 per cent adequacy and the girls 10-12 years from rural and urban areas of girls represented 197.96 & 187.08 per cent adequacy for the milk intake. Mean milk and milk product intake of rural subjects were noted to be significantly higher ($p<0.01$) than their urban counterparts. The boy and girl subjects of the elder group (10-12 years) were found to be having little more amounts of fats and oils boy and girl subjects (15.13 & 13.01g, 11.06 to 12.50g &) indicating 60.53 and 52.05, 44.26 to 50.00 & per cent adequacy respectively. The difference in the fats and oil intake of rural and urban subjects of both the age groups was noted to be significant at 1 per cent level of significance. The boy and girl subjects per day were having little more amount of sugar in their daily diets i.e. (19.74 & 18.09 g) and (15.44 to 17.08g) respectively. Mean sugar intake of boy subjects was noted to be significantly higher ($p<0.01$) than their girl counterparts. The subjects aged 10-12 years including both the groups of the subjects boy and girl of rural and urban areas were found to be 16.57 to 17.78g and 15.00 to 15.83g of nuts and oilseeds respectively in their daily meals. The difference in the nuts and oilseeds intake of rural and urban subjects of both the age groups was noted to be significant at 1 per cent level of significance. Irrespective of age, gender and area of study were noted to be consuming negligible amount (1.46, 1.23, 0.93, and 1.04) of meat and poultry products. Finding present study indicates there is a great scope to improve the food consumption patter and food knowledge to the subjects.

Keywords: food consumption pattern, nutrition, significant, counterparts, food intake

Introduction
Children are descendants of the country. Appropriate engrossment must be reimbursed to their quality education and nutritious healthy food. School-age children make up a significant proportion of the world's population, about 24 per cent of the population in the less developed world and about 15 per cent of the industrialized world. In primary school, children receive primary education at the age of about 6 to 12 years, coming to pre-school and middle school. In most regions of the world, primary education is the first stage of compulsory education and it can be provided free or at a paid private school (http://search.eb.com/eb). According to the census (2011), children of the age group of six to twelve years account for about $1/5^{th}$ of India's total population (1.21 billion). They have contributed to the vital potential of humankind and strengthened national economic strength. The body needs a lot of nutrients during the teenage growth spurt that must be accumulating in the body throughout the childhood and whenever the body suffer from nutrient deficiency, this may lead to harmful health consequences such as delayed growth, academic retardation and reduced work capacity (Shivprakash and Joseph, 2014) [2]. Growth over six to twelve years is slow but stable, accompanied by a steady increase in food intake. Children stay in school for much of the day and they start participating in school activities such as organized sports, recreational programmes, art activities etc.

The influences of peers and adults such as teachers, coaches, or sports icons are increasing. Except for severe issues, most behavioural problems connected with food have been resolved by this age, and children enjoy eating to alleviate hunger and obtain social satisfaction (Mahan *et al.*, 2012) [3]. The nutritional requirements of a boy and girl are somewhat the same until the age of 9 years and after that, there is a gender-wise disparity in most nutrients (ICMR, 2010) [4]. The nutritional demands of children stay particular and require appropriate attention. The particular concern mainly depends on the formation and care of recent body tissues, higher levels of physical activity and to some amount, the inherent and substantial factors of a growing child's response to his/her maturity and surrounding environment. Growing children need a lot of energy intake because of high activities, good quality proteins and minerals for their growth and demand for vitamins has increased due to the characteristic high metabolic activity (Ghosh, 2004) [5]. Due to the growing interest and involvement in other activities that compete with meal times of this age. Breakfast is exclusively crucial for an elementary school-age child. It can interrupt fasting after an overnight sleep and prepare the child for problem-solving and memory span in the learning period at school. Children, who skip breakfast do not compensate for nutrition and energy deficiencies later in life and tend to have less cognitive function than those, who eat breakfast. The school lunch programme provides a nutritional lunch for many children, who would not otherwise have one. While eating at school with other kids, they observe a variety of foods and taste new foods that they might not normally accept. School-age children are increasingly exposed to the effects of eating habits (growing well.com).

Children are the most vulnerable asset of any nation, walk on their tiny feet. School going children are the most important segment of a society who is vulnerable to retardation in growth, because of undernutrition. It is estimated that the majority of the undernourished people in the world live in the Indian subcontinent and most of them are children. School life is nutritionally important because this is the first time to build body stores of nutrients in preparation for rapid growth. Nutrition plays a vital role, as insufficient nutrition during childhood may lead to malnutrition, delayed growth, reduced ability to work and poor mental and social development (Awasthi *et al.*, 2000) [6]. In children, protein/ calorie deficiency leads to underweight, wasting and reduced infection resistance, stunted growth and poor cognitive development and learning.

Poverty, ignorance and illiteracy are identified as major causes responsible for this situation. Nevertheless, the etiology of malnutrition is multifactorial, including complex interaction between genetic background, hormones and numerous social as well as real aspects such as lifestyle and unhealthy eating habits (Afridi, 2011) [7].

Globally, malnutrition among school-age children is becoming a major public health problem. More than 200 million school-age children are stunted and underweight. If there is no action is taken, about 1 billion school children will grow up and their physical and mental development will be impaired by 2020 (Mitra *et al.*, 2007).

This requires a comprehensive study of the current nutritional status of children to make pivotal adjustments in their nutritional practices. There is a relative scarcity of literature on information regarding the nutritional status of children attending school, especially from arid regions such as Bikaner (Rajasthan). Keeping this in mind, the current study, therefore, is planned to assess the nutritional status of primary school children in changing the scenario of food practices.

Methodology

The study was conducted on 10-12 years old studying in primary school of Bikaner Disctrict (Rajasthan) including both urban and rural areas. Fifty percent children of the study belonging to both rural and urban areas were randomly selected for their detailed study through visiting their home. The willingness of the parents and children to co-operate during the data collection was also taken care before selecting the subjects for the second phase. Thereafter, informed consent was obtained from the parents of all the selected children. A research goal was also communicated to all the parents to seek their understanding and co - operation during the period of study. During home visits of the children their mothers or guardians were contacted to collect information about their socio-economic profile, dietary pattern, physical activity and health status as follows:

Data collection

Pre tested questionnaire as used to record the information of school children and their parents. Age were recorded simply asking date of birth from each participants were varyfied from school record book. Before data collection, cooperation and willingness of parents as well as children was considered during the entire study. Home visits were planned and executed for each of the children in both the areas to obtain detailed information with respect to his/ her general information, socio-economic profile, BMI, dietary pattern, physical activity profile and health profile

Statistical analysis of the data

Percentage mean and standard deviation of data were calculated during present study for statistical analysis of findings. The statistical analysis was carried out with the help of Microsoft excel 2007.

Result and Discussion

It can be revealed in Table 1 that out of 244 rural subjects 100 (40.98) were boys and 144 (59.01%) were girls. Among 121 urban subjects, 58 (47.93%) were boys and 63 (52.06%) were girls. In the age group of 10 -12 years 56.71and 43.28per cent were girls and 40.98 and 47.93 per cent were boys.

Table 1: Distribution of the subjects according to their age.

Variables	Total subjects (N=365)	Rural subjects 10-12 (n=244)	Urban subjects 10-12 years (n=121)
Gender			
Boys	158 (43.28)	100(40.98)	58(47.93)
Girls	207(56.71)	144(59.01	63(52.06)

Note: Values in parenthesis indicate percentage of the subjects

Cereals

The cereals intake of 10-12-year-old rural and urban boys was found to 203.12 & 205.07 against 330 g suggested intake, indicating 61.55 & 62.14 per cent adequacy completely. Similarly, daily mean cereal intake of rural and

urban girls was found to be 190.71 & 183.45 against 270 g suggested intake showing 70.63 & 67.95 per cent adequacy. The difference in the cereal intake of rural and urban subjects of both the groups was noted to be significant at 5 per cent level of significance.

Pulses

The pulses intake of 10-12 years old rural and urban boy and girl subjects was found to be the per cent adequacy of pulse intake was found to be, 33.73 to 38.66, and 39.35 to 36.24 per cent respectively against 60g suggested intake per day. Table 1 & 2 clearly indicates that urban subjects had better pulses intake than their rural counterparts. Further, irrespective of age and area of study, the mean intake of boy subjects 20.24, 23.20 had better pulse consumption than the girl subjects i.e. 23.61, 21.74. Mean pulse intake of urban subjects was noted to be significantly higher ($p< 0.01$) than their rural counterparts. Kulsum *et al.*, (2008) selected 271 children between the ages of 4-14 years. Intake of cereals and pulses was inadequate in younger children but improves with age. Intake of other vegetables was higher than recommended levels, but that of green leafy vegetables was extremely low. Consumption of fats, oils and milk was very low while protein was derived from plant sources for the majority of the children. Only 22 per cent of children enjoyed a diet adequate in protein and calories.

Green leafy vegetables

It is alarming to note that against 100 gm suggested intake of green leafy vegetables the rural and urban girl and boy subjects of 10-12 years were consuming very meagre amount. The suggested intake of green leafy vegetables for 10-12 years old boys and girls is 100 gm per day.But rural and urban boys and girls were having only 15.86 &13.40 &13.77, 11.67, per cent adequacy for their green leafy vegetables intake. The difference in the green leafy vegetable intake of rural and urban subjects of both the groups was noted to be significant at 1 per cent level of significance.

Roots and tuber

Immaterial of the age group of the present study suggested intake for roots and tubers is 100g per day. The root and tuber intake of 10-12-year-old boy rural and urban subjects represented 35.65 and 34.32 per cent adequacy for roots and tubers intake. Similarly, intake of 10-12 years old girl subjects the adequacy was 32.74 to 30.68 per cent.

Other vegetables

The 10-12 years old boy and girl subjects from rural and urban areas indicated 40.28 & 28.95 per cent and 36.09 & 30.34 per cent adequacy for the consumption of other vegetables. Mean other vegetable intakes of urban subjects were noted to be significantly higher ($p<0.01$) than their counterparts. The consumption was noted to greater for boy subjects than girl counterparts. The rural subjects had better consumption of other vegetable than urban subjects. However, in each case, the consumption was less than 50 per cent.

Fruits

As per suggested intake, the subjects of the present study must consume 100gm of fruits every day. Per cent adequacy of fruit consumption for 10-12 years of age group for rural and urban boy and girl subjects ranged from 53.72 & 46.30, 38.19 & 34.90, per cent respectively. The difference in the fruit's intake of rural and urban subjects of both the subjects was noted to be significant at 1 per cent level of significance.

Milk and Milk Products

Boys of 10-12 years age group from rural and urban areas showed 203.24 & 194.38 per cent adequacy and the girls 10-12 years from rural and urban areas of girls represented 197.96 & 187.08 per cent adequacy for the milk intake. Mean milk and milk product intake of rural subjects were noted to be significantly higher ($p<0.01$) than their urban counterparts. The rural and urban boy subjects in both the categories had better milk intake than girl subjects. Further, rural subjects had better adequacy of milk and milk product consumption than their urban counterparts. Milk was also provided to all subjects in mid-day scheme in both areas. Milk & milk product was only the food group which was found taken not only adequately but almost double in the amount by subjects. Therefore, the subjects of the present study had more than 100% adequacy for milk consumption.

Fats and Oil

The suggested value for fats and edible oils is 30g/day for both the age groups and both the genders. The boy and girl subjects of the elder group (10-12 years) were found to be having little more amounts of fats and oils boy and girl subjects (15.13 & 13.01g, 11.06 to 12.50g &) indicating 60.53 and 52.05, 44.26 to 50.00 & per cent adequacy respectively. The difference in the fats and oil intake of rural and urban subjects of both the age groups was noted to be significant at 1 per cent level of significance.

Sugar and Jaggery

The requirement of sugar has been suggested as 30g (IDA 2011) for all the subjects under the present study. The boy and girl subjects per day were having little more amount of sugar in their daily diets i.e. (19.74 & 18.09 g) and (15.44 to 17.08g) respectively. Mean sugar intake of boy subjects was noted to be significantly higher ($p<0.01$) than their girl's counterparts.

Nuts and Oilseeds

The subjects aged 10-12 years including both the groups of the subjects boy and girl of rural and urban areas were found to be 16.57 to 17.78g and 15.00 to 15.83g of nuts and oilseeds respectively in their daily meals. The difference in the nuts and oilseeds intake of rural and urban subjects of both the age groups was noted to be significant at 1 per cent level of significance.

Meat and Poultry

Irrespective of age, gender and area of study were noted to be consuming negligible amount (1.46, 1.23, 0.93, and 1.04) of meat and poultry products.

Similarly, Jood *et al.*, (2002) reports that consumption of cereals (95 & 98% of RDA), Pulses (78 & 88% of RDA), green leafy vegetables (39 & 53% of RDA), Fruits (32 & 40% of RDA), milk and milk product (72 & 89% of RDA), fats & oils (77& 87% of RDA) sugar & *jaggery* were (63 & 77% of RDA) was deficient in control subjects. Among nutrients, the daily mean intake of energy, protein, β - carotene and vitamin C were also found lower in deficient

subjects compared to control subjects. Trave *et al*, (2014) carried out a study to get the dietary habits of students of primary education (9-12 years) with normal nutritional status. Cereals (34%) dairy products (19%) and meats (17%) were responsible for approximately 70% of total calorie intake. Intakes of meat and sugar were too high and dairy products and cereals consumption were relatively limited, while that of vegetables, legumes, fruits and fish were insufficient.

Table 2: Mean ± SD food intake of rural and urban boy subjects (10-12 years)

Food groups	Suggested Intake*	Food Mean Intake			
		Food mean intake of rural subjects		Food mean intake of urban subjects	
		Mean ± SD	% Adequacy	Mean ± SD	% Adequacy
Cereals & Grains Products (g)	330	203.12± 43.99*	61.55	205.07± 62.55*	62.14
Pulses & Legumes (g)	60	20.24± 8.24**	33.73	23.20±10.99**	38.66
Green Leafy Vegetable (g)	100	15.86 ± 18.59**	15.86	13.40± 8.49**	13.40
Roots & Tubers Products (g)	100	35.65± 24.82	35.65	34.32±20.71	34.32
Other Vegetable (g)	100	40.28 ± 16.31**	40.28	28.95± 12.54**	28.95
Fruits (g)	100	53.72± 28.84**	53.72	46.30±26.91**	46.30
Milk & Milk products (ml)	100	203.24± 20.72**	203.24	194.38± 35.73**	194.38
Fats & Edible oil (g)	35**	15.13± 4.75**	60.53	13.01± 2.61**	52.05
Sugar/Jaggery (g)	30	19.74± 7.90**	56.40	18.09± 10.14**	51.68
Nuts & Oil Seeds (g)	-	16.57 ± 16.02**	-	17.78± 13.10**	-
Meat & Poultry Products (g)	-	1.46 ± 6.19	-	1.23± 4.37	-

Note: Values in parenthesis indicate percentage of the subjects *IDA (2011), **ICMR (2010) [4], Significant at 5% & 1% level

Table 3: Mean ± SD food intake of rural and urban girl subjects (10-12 years)

Food groups	Suggested Intake*	Food Mean Intake			
		Food mean intake of rural subjects		Food mean intake of urban subjects	
		Mean ± SD	% Adequacy	Mean ± SD	% Adequacy
Cereals & Grains Products (g)	270	190.71 ± 32.04*	70.63	183.45 ± 44.23*	67.95
Pulses & Legumes (g)	60	23.61± 9.24**	39.35	21.74± 15.33**	36.24
Green Leafy vegetable (g)	100	13.77 ± 16.64**	13.77	11.67±15.46**	11.67
Roots & Tubers Products (g)	100	32.74± 16.74	32.74	30.68± 21.87	30.68
Other Vegetable (g)	100	36.09± 14.00**	36.09	30.34 ± 12.50**	30.34
Fruits (g)	100	38.19± 24.52**	38.19	34.90± 28.70**	34.90
Milk and milk products (ml)	100	197.96± 16.90**	197.96	187.08± 47.76**	187.08
Fats & Edible oil (g)	35**	11.06 ± 1.70**	44.26	12.50± 2.86**	50.00
Sugar/Jaggery (g)	30	15.44 ± 6.97**	51.47	17.08± 8.56**	56.94
Nuts & Oil seeds (g)	-	15.00 ± 14.59**	-	15.83 ± 13.41**	-
Meat & Poultry Products (g)	-	0.93± 4.74	-	1.04± 4.04	-

Note: Values in parenthesis indicate percentage of the subjects *IDA (2011), **ICMR (2010) [4], Significant at 5% & 1% level

Conclusion

During present study total of 365 rural and urban primary school children comprising of 207 girls (144 rural, 63 urban) and 158 (100 rural, 58 urban) were boys. The consumption of green leafy vegetables were very meager amount in both the areas of boy and girls subjects. On the otherhand the calcium consumption were very high due the dairy pet at home of the subjects as well as they are getting milk from the school under the programme Mid-day meal. The meat consumption is very less amount and very irregular because of low income group people.

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