Assessment of dietary pattern of adolescents in Himachal Pradesh of India

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ABSTRACT

Dietary knowledge and access to resources are critical to improve health and nutritional status in a sustainable way. The present study was conducted to assess the dietary pattern and associated intake of different essential nutrients and vitamins by adolescents in Himachal Pradesh of India. A sample of 150 adolescents in the age group of 11-19 years from the two selected blocks (Panchrukhi and Bhawarna) of Kangra district of Himachal Pradesh was selected randomly to collect information on dietary habits, frequency of eating out, type of fat used for cooking, food fads and fallacies and different nutrients intake across genders. It was found that majority of the male and female adolescents took meals three times a day and preferred home prepared foods. Females were mostly vegetarian whereas males were non- vegetarian. Majority of the male and female adolescents liked fried foods compared to pressure and fire wood cooked foods. Adolescents preferred foods fried in raw mustard oil. Majority of the respondents did not have any restrictions and beliefs regarding consumption of any type of food. There was significant difference in the mean intake of different essential nutrients and vitamins between the male and female adolescents reflecting prevalence of disparity in nutritional status across genders. Intake of most of the nutrients and vitamins by male and female adolescents were below the Recommended Dietary Allowances (RDA) of Indian Council of Medical Research.

Keywords: Dietary pattern; Nutrient intake; Food fads and fallacies and Adolescents

INTRODUCTION

Healthy eating in adolescence is important for proper growth and development of human being. Dietary pattern developed during adolescence may contribute to eating disorders and increased risk for several important chronic diseases later in life. In recent decades dietary patterns in developing countries have been changed in a similar way as in developed countries with high prevalence of chronic diseases (obesity, diabetes, cardio vascular and renal diseases). Adolescence is the second fastest growth stage in the life cycle. Although genetic factors undeniably influence the growth of adolescent to a certain extent, dietary intake has also a significant effect. Adolescence is a period when youngsters start to make their own food choices and the eating habits they adopt probably persist into adulthood. The present study was undertaken with the objective of assessing dietary pattern of adolescents and their nutrients intake and its disparity across the genders in Himachal Pradesh of India.

MATERIALS AND METHODS

A sample of 150 adolescents in the age group of 11-19 years was selected randomly from the two blocks i.e. Panchrukhi and Bhawarna of Kangra district of Himachal Pradesh. A well structured pre tested interview schedule was used for collection of data on meal pattern, food habits, method and medium of cooking, food preferences, salt intake, foods fads and fallacies, nutrients and vitamins intake. Information regarding the intake of food for three consecutive days was collected from respondents using 24 hours recall method. Standard measures including glasses, katories, serving spoons were used for estimating the amounts of foods. Amount of food consumed or reported was recorded in terms of standard size utensils. Detailed information about the ingredients used and the method of cooking was also recorded. The amount of cooked food was converted into raw ingredients and nutrient intake was calculated using food composition

RESULTS

Meal pattern

The meal pattern (Table 1) revealed that majority of male adolescents (49.34%) took meals more than thrice a day followed by thrice a day (46.66%) and twice a day (4.00%) whereas majority of female adolescents (64.00%) took meals thrice a day followed by more than thrice a day (29.34%) and twice a day (6.66%). Overall, majority of adolescents (55.34%) took meals thrice a day. Food habits revealed that 50.67% of males were non-vegetarian followed by 38.66% vegetarian and 10.67% semi-vegetarian (consume milk and egg) whereas for females 62.66% were vegetarian, 20.00% non-vegetarian and 17.34% semi-vegetarian respectively. Overall, half of the adolescents (50.66%) were vegetarian and the other half was non vegetarian (35.34%) and semi-vegetarian (14.00%). Regularity of taking meals was more common in females (58.66%) than in males (52%). More than half of the adolescents (53.33%) reported having regular meals. Majority of males (60.00%) and females (66.6%) took light meals whereas taking heavy meals were more common among males (22.67%) than females (12.00%). Overall, light meals (63.34%) and frequent small meals (19.33%) were preferred by most of the adolescents. Overall, half of the adolescents (51.34%) consumed moderate salt and only 5.33% of adolescents reported having high intakes of salt.

Table 1. frequency distribution respondents according to meal pattern (in nos.)

Particulars	Male (n=75)	Female (n=75)	Total (N=150)
Frequency of taking meals per day			
Once	-	-	-
Twice	3 (4.00)	5 (6.66)	8 (5.33)
Thrice	35 (46.66)	48 (64.00)	83 (55.34)
More	37 (49.34)	22 (29.34)	59 (39.33)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Foods habits			
Vegetarian	29 (38.66)	47 (62.66)	76 (50.66)
Non-vegetarian	38 (50.67)	15 (20.00)	53 (35.34)
Semi-vegetarian	8 (10.67)	13 (17.34)	21 (14.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Regularity of taking meals			
Regular	39 (52.00)	44 (58.66)	83 (55.33)
Irregular	36 (48.00)	31 (41.34)	67 (44.67)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Structure of meals			
Frequent small meals	13 (17.33)	16 (21.33)	29 (19.33)
Light meals	45 (60.00)	50 (66.67)	95 (63.34)

Heavy meals	17 (22.67)	9 (12.00)	26 (17.33)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Taking salt with meal			
More salt	3 (4.00)	5 (6.66)	8 (5.33)
Low salt	16 (21.33)	21 (28.00)	37 (24.67)
Moderate salt	36 (48.00)	41 (54.67)	77 (51.34)
Not at all	20 (26.67)	8 (10.67)	28 (18.66)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Figures in parenthesis indicate percentages of respondents.			

Liking of foods based on method of cooking, medium of cooking and place

Results indicate that majority of the males (65.33%) and females (69.33%) liked fried foods followed by pressure cooked foods 34.67% and 26.67% respectively (Table 2). Only a few of the females (4.00%) liked fire wood cooked foods. Majority of males (64.00%) and females (76.00%) reported that they preferred home prepared foods and street foods (26.66% of male and 18.66% of female) versus restaurant foods (9.34% of male and 5.34% of female). More than 50% of the adolescents liked foods prepared in mustard oil (52.67%) and ghee was not the preferred cooking oil among adolescents (4.67%).

Frequency of dining out side

Majority of the male (60.00%) and female (73.33%) rarely dined outside. Only 8.00% and 4.00% of males reported dining outside monthly and weekly respectively (Table 2).

Table 2. Distribution of respondents based on liking of foods and frequency of dining outside (in nos.)

Particulars	**Male (n=75)**	**Female (n=75)**	**Total (N=150)**
Liking of foods based on method of cooking			
Raw foods	-	-	-
Fried foods	49 (65.33)	52 (69.33)	101 (67.33)
Boiled foods	-	-	-
Pressure cooked	26 (34.67)	20 (26.67)	46 (30.67)
Oven cooked	-	-	-
Fire wood	-	3 (4.00)	3 (2.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Liking of foods based on medium of cooking			
Refined oil	31 (41.33)	33 (44.00)	64 (42.66)
Butter	-	-	-
Ghee	5 (6.67)	2 (2.66)	7 (4.67)
Mustard oil	39 (52.00)	40 (53.34)	79 (52.67)
Coconut oil	-	-	-
Total	75 (100.00)	75 (100.00)	150 (100.00)
Liking of foods based on place			
Home prepared foods	48 (64.00)	57(76.00)	105 (70.00)
Fast foods on street	20 (26.66)	14 (18.66)	34 (22.67)
Restaurant	7 (9.34)	4 (5.34)	11(7.33)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Frequency of dining outside			
Daily	-	-	-
Weekly	3 (4.00)	-	3 (2.00)
Fortnightly	11 (14.66)	13 (17.33)	24 (16.00)
Monthly	6 (8.00)	-	6 (4.00)

Occasionally	10 (13.34)	7 (9.34)	17 (11.33)
Rarely	45 (60.00)	55 (73.33)	100 (66.67)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Figures in parenthesis indicate percentages of respondents			

Food fads and fallacies

Majority of the males (82.67%) and females (73.34%) did not have any beliefs and restrictions related to consumption of any food (Table 3). However, approximately 20.00% of adolescents had specific beliefs and restrictions regarding food intake.

Table 3. Information regarding food fads and fallacies

Particulars	**Male (n=75)**	**Female (n=75)**	**Total (N=150)**
Restrictions and beliefs regarding foods intake			
Yes	13 (17.33)	20 (26.66)	33 (22.00)
No	62 (82.67)	55 (73.34)	117(78.00)
Total	75 (100.00)	75 (100.00)	150 (100.00)
Figures in parenthesis indicate percentages of respondents.			

Mean intake of nutrients and vitamins

Mean energy intake was 2201.06 kcal and 1987.70 kcal for male and female respondents respectively with a standard error of difference of mean ±50.14 (Table 4). Mean energy intake of males were significantly ($p<0.05$) higher than females. Mean intakes of protein, fat and carbohydrates among male and female adolescents were 72.55 gm and 61.11 gm, 25.93 gm and 22.74 gm and 407.43 gm and 381.73 gm respectively with standard error of difference of mean as ±1.45, ±0.90 and ±7.90 respectively at 5 per cent level of significance. Mean daily intake of calcium and iron among male and female respondents were 522.49 mg and 456.50 mg and 23.08 and 19.41 mg respectively with significant differences ($p<0.05$).Results of vitamin intake revealed that mean daily intake of β Carotene and vitamin B_1 among males and females were 494.27 µg and 426.28 µg and 1.60 mg and 1.15 mg respectively with standard error of difference of mean as ±24.37 and ±0.05 respectively at 5 per cent level of significance. However, mean daily intake of vitamin B_2, Niacin and Vitamin C among males and females were 1.21 µg and 1.15 µg, 16.15 mg and 15.83 mg and 28.32 mg and 28.90 mg respectively with standard error of difference of mean as ±0.05, ±0.40 and ±1.26 respectively which were not statistically significant. Vitamin-C intake was similar among both sexes.

Table 4. Gender differences in mean intake of nutrients by the respondents

Nutrients /sex	**Male**		**Female**		**Standard error of differences of mean**	**t-value**
	Mean	**Standard deviation**	**Mean**	**Standard deviation**		
Energy (kcal/d)	2201.06	304.28	1987.70	309.86	±50.14	4.25*
Protein (gm/d)	72.55	9.29	61.11	8.55	±1.45	7.84*
Fat (gm/d)	25.93	6.31	22.74	4.57	±0.90	3.54*
Carbohydrate (gm/d)	407.43	48.24	381.73	48.62	±7.90	3.24*
Calcium (mg/d)	522.49	94.90	456.50	108.26	±16.62	3.96*
Iron (mg/d)	23.08	6.49	19.41	4.90	±0.93	3.91*
β Carotene (µg/d)	494.27	165.50	426.28	131.09	±24.37	2.78*
Thiamine/Vitamin B_1 (mg/d)	1.60	0.37	1.15	0.32	±0.05	2.05*
Riboflavin/Vitamin B_2 (mg/d)	1.21	0.37	1.15	0.34	±0.05	1.03 NS
Niacin/Vitamin B_3 (mg/d)	16.15	2.59	15.83	2.34	±0.40	0.78 NS
Vitamin-C (mg/d)	28.32	7.23	28.90	8.21	±1.26	0.45 NS
*Significant at 5% level, Non-significant (NS)						

DISCUSSION

The present study was conducted to assess the dietary pattern of adolescents of Himachal Pradesh. The results revealed that meal pattern of the majority of the adolescents were 3 or >3 meals a day. Majority of adolescents were vegetarian. However, males were mostly non-vegetarian whereas females were vegetarian. This can be due to the more community restrictions among females than males. Meal pattern among Female adolescents were comparatively more regular than males. Majority of adolescents preferred light meals followed by frequent small meals. The similar pattern of three meals a day was reported in Pakistani adolescents by Ahmad *et al.* [1]. Majority of both male and female adolescents were found to have taken moderate level of salt which was a positive factor from health perspective. The study revealed that majority of male and female adolescents liked to have fried foods in raw mustard oil. However, majority of adolescents did not have any beliefs and restrictions regarding intake of any food which was a positive aspect of dietary pattern in the survey area.The mean energy intake by male adolescents was significantly higher than female. This finding was also supported by Ukegbu *et al.* [5]

who found mean intake for energy was significantly higher in boys compared to girls in Nigeria. However, mean intake of energy by both males and females was below the Recommended Dietary Allowances (RDA) (Table 5) of Indian Council of Medical Research [3].

Protein intake for both male and female adolescents was more than the RDA (Table 5) of ICMR [3]

However, the mean intake of protein by male was significantly higher than female. The mean intake of fat by male adolescents was significantly higher than female. The finding was supported by Ukegbu *et al.* [5]. Fat intake for both male and female adolescents was more than the RDA (Table 5) of ICMR [3]. The difference between mean intake of carbohydrate by male and female adolescents was significant which was also supported by Ukegbu *et al.* [5].

In case of Calcium and Iron, mean intake by males was significantly higher than females. However, both Calcium and Iron intake were below the RDA (Table 5) of ICMR [3] for both male and female adolescents similar to the report of Sangeetha *et al.* [4]. Mean Intake of β Carotene and Thiamine/ Vitamin B_1 by male was significantly higher than female adolescents. However, β Carotene intake was below the RDA of ICMR [3] whereas Thiamin intake was above the RDA (Table 5) of ICMR [3] for both male and female adolescents. In case of Riboflavin/ Vitamin B_2, Niacin/ Vitamin B_3 and Vitamin C, there was no significant difference in mean intake between males and females. Riboflavin intake was below the RDA of ICMR [3] for both male and female adolescents whereas Niacin intake for males was approximately as per the RDA of ICMR [3] and for females above the RDA (Table 5) of ICMR [3].

Table 5. Summary of Recommended Dietary Allowances (RDA) for Indians

Group	Particulars	Body Wt. Kg	Net Energy Kcal/d	Protein g/d	Visible Fat g/d	Calcium mg/d	Iron mg/d	Vitamin A µg/d		Thiamine mg/d	Riboflavin mg/d	Niacin Equivalent mg/d	Pyridoxine mg/d	Asco-rbic Acid mg/d	Dietary folate µg/d	$Vit.B_{12}$ µg/d	Magnesium mg/d	Zinc mg/d
								Retinol	β Carotene									
Man	Sedentary work	60	2320	60.0	25	600	17	600	4800	1.2	1.4	16	2.0	40	200	1.0	340	12
	Moderate work		2730		30					1.4	1.6	18						
	Heavy work		3490		40					1.7	2.1	21						
Women	Sedentary work	55	1900	55.0	20	600	21	600	4800	1.0	1.1	12	2.0	40	200	1.0	310	10
	Moderate work		2230		25					1.1	1.3	14						
	Heavy work		2850		30					1.4	1.7	16						
	Pregnant woman		+350	82.2	30	1200	35	800	6400	+0.2	+0.3	+2	2.5	60	500	1.2		12
	Lactation 0-6 m		+600	77.9	30	1200	25	950	7600	+0.3	+0.4	+4	2.5	80	300	1.5		
	6-12 m		+520	70.2	30					+0.2	+0.3	+3	2.5					
Infant	0-6 m	5.4	92 kcal/ kg/d	1.16 g/kg /d	--	500	46 µg/kg/d	--	--	0.2	0.3	710 µg/kg	0.1	25	25	0.2	30	--
	6-12 m	8.4	80 kcal/ kg/d	1.69 g/kg /d	19		05	350	2800	0.3	0.4	650 µg/kg	0.4				45	--
Children	1-3 y	12.9	1060	16.7	27	600	09	400	3200	0.5	0.6	8	0.9	40	80	0.2-1.0	50	5
	4-6 y	18.0	1350	20.1	25		13	600	4800	0.7	0.8	11	0.9		100		70	7
	7-9 y	25.1	1690	29.5	30		16			0.8	1.0	13	1.6		120		100	8
Boys	10-12 y	34.3	2190	39.9	35	800	21	600	4800	1.1	1.3	15	1.6	40	140	0.2-1.0	120	9
Girls	10-12 y	35.0	2010	40.4	35	800	27			1.0	1.2	13	1.6				160	9
Boys	13-15 y	47.6	2750	54.3	45	800	32			1.4	1.6	16	2.0	40	150	0.2-1.0	165	11
Girls	13-15 y	46.6	2330	51.9	40	800	27			1.2	1.4	14	2.0				210	11
Boys	16-17 y	55.4	3020	61.5	50	800	28			1.5	1.8	17	2.0	40	200	0.2-1.0	195	12
Girls	16-17 y	52.1	2440	55.5	35	800	26			1.0	1.2	14	2.0				235	12

Source: Nutrient requirements and recommended dietary allowances for Indians: A report of the expert group of the Indian Council of Medical Research. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad. 2009

In case of Vitamin C, intake by both male and female adolescents was below the RDA (Table 5) of ICMR [3] similar to the report of Sangeetha *et al.* [4].The present study revealed that though food intake in quantitative terms was adequate for adolescents, it was inadequate from nutritional perspective as their intake of different essential nutrients and vitamins was below the RDA of ICMR. Further, there was a significant difference in mean intake of nutrients between male and female adolescents revealing the existence of disparity in health and nutrition status across genders in the area.

CONCLUSION

Adolescence is the time to learn and adopt healthy habits to avoid health and nutritional problems later in life. In view of the findings, it is suggested that designing appropriate nutritional course curriculum for adolescents at school; improving access to health and nutritional information by adolescents through recreational activities and mass media; imparting knowledge to mothers on appropriate nutritional requirements and associated dietary guidelines; effective implementation of different interventional programs such as mid day meal at school level can go a long way to improve the nutritional status and its disparity across genders in Himachal Pradesh.

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