International Journal of Food Science and Nutrition
ISSN: 2455-4898
Impact Factor: RJIF 5.14
www.foodsciencejournal.com
Volume 3; Issue 4; July 2018; Page No. 57-60

Gender disparity in mean nutrient intake among vegetarians and non-vegetarians

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Abstract
Gender dimension in nutrition security includes dietary intake which reflects on the nutritional/health status of an individual. Although it depends on a host of external factors, there is an internal relationship in the nutrient intake. The objective of the study is to elucidate gender differences in nutrient intake among adult couples and to compare the nutrient intake between vegetarians and non-vegetarians. 70 couples aged 45-54 years from different socioeconomic classes (SEC) of Karkala and Moodbidri taluks formed the study population. Using diary technique, food intake data was recorded and the calculated macro and selected micronutrient compared with standards of Recommended Dietary Allowances (RDA's) compiled by National Institute of Nutrition, Hyderabad. Results showed a mean nutrient (Energy) intakes of male and female's partners respectively are: 2042±369.92 and 1875±511.09Kcals, 50.30.3±8.170 and 51.27±24.569g protein, 32.4±5.997 and 56.91±20.946g fat; compared to RDA, intake of all the nutrients except fat and calcium were markedly low. Among vegetarians, the entire nutrient intake was satisfactory except for iron and non-vegetarians had a deficit in calorie intake and extremely high intake of calcium compared to the other nutrient intake which met the RDA standards. It is obvious in our findings that the nutrient intake varied between gender cohorts; however, there were few clinically significant differences in nutrient intake between adult couples which may incurs risk for nutrient deficiency.

Keywords: gender, non vegetarians, nutrient intake, RDA, vegetarians

Introduction
Gender is the social meaning of biological sex differences. The fundamental feature of gender analysis is to identify individual differential access to resources and benefits equitable access and distribution will enhance nutrition security [1-4]. The gender bias in the allocation of resources within a household is an important component of the relationship between food and nutrition security. Gender inequalities in quantity and quality of food intake may contribute to under-nutrition and over-nutrition. There has been population studies indicating increased risk of overweight and obesity among those who are food insecured [5, 6]. The disparity between the food supply and the intake of foods and nutrients has been getting larger ever since 1970's Survey from western countries show gender differences in food consumption, nutrient intake and attitudes towards food. Comparing gender differences in the nutrient intake may increase understanding of their health status, as their consumption seem to be related to social norms and cultural beliefs? In all these initiatives the issue that is given least prominence is the "Gender in the context of Nutrition advocacy and social significance". Such approaches should take into account gender differences when examining objective nutrient intake. Dietary practices and food choices are related to wellness and food intake with a known amount of essential micro nutrient of an individual [7].
Food security can be achieved only when the right kind and the right amount of food is consumed so that all the required nutrients are provided. Also meals provide a sense of security and meaning to an adult's day. Inclusion of variety of foods is an important aspect in diets. Diet surveys carried out by National Nutrition Monitoring Bureau in different states of India shows that the mean nutrient intake of energy is more than recommended allowances (RDA), while protein is low in both males and females, mean intake of protein and energy were comparatively lesser than recommended values in both sexes. The intake of iron, vitamin A and riboflavin were also below the recommended values as the intakes of other vegetables were much better than the green leafy vegetables. Calcium intakes were extremely lower leading to age onset osteoporosis. In view of these, it is likely that the dietary requirement of Indians is substantially lower than the present ICMR recommendations. Consequently, analysis of food and nutrition security with particular attention to gender is appropriate in assessing and improving the nutrition security [8].

Objectives of the study
- To examine the gender difference in mean nutrient intake
- To compare the mean nutrient intake between vegetarians and non-vegetarians.

Methodology
The data is a part of epidemiological study, 70 of men and women couples were (35 from each taluks) selected for nutritional assessment. The inclusion criteria for selection of

the sub sample were as follows: Age of men 45-64 women 40-55. A consent letter was obtained from the participants. Food intake was recorded by 7 days dairy technique. The female partners were trained to record the intakes using a 200ml cup identified form their respective households. Nutrient intake from the dietary data was compared using a ready recknor for cooked foods standardized for the purpose [9].

Statistical Analysis

Descriptive analysis was used to analyze the data; Chi-square analysis was employed for comparisons between variables. Mean, Standard Error and co efficient of variation was calculated. The means were compared using Student t test, period't' and Coefficient Correlation was performed among the variables to indicate the dependence on one another (Pearson's correlation tests).

Results and Discussion

Assessment of gender differences in particular with food and nutrition security is appropriate in assessing nutrition security [10]. So, the present study was considered to investigate the gender differences in nutrient intake as one of the objectives.

Table 1 presents that mean intake of males and females from vegetarian population and their adequacies with references to ICMR recommendations. Mean consumption of energy by males and females were 2011±286 and 1530±407.68 kcals/day respectively, this comprised 64% and 70% of their RDA respectively. Protein intake was 50.3±9.347 and 45.1±30.769 gms/day, the percentage adequacy was 84% and 90% for males and females respectively. Intake of fat was high amount to 145-234% of RDA, it is encouraging to note that calcium, retinol and iron intake of vegetarians both males and females was satisfactory with special respect to iron. Both the genders consumed sufficient iron to meet their RDA's. The most limiting nutrient was found to be β carotene. The reason for such a low intake of this nutrient (β carotene) could be due to the less frequent use of greens and vegetables, since these forms the main source. It could be concluded that except for calories and β carotene other nutrients were consumed in fairly good proportion to meet the requirements. Similarly, it was interesting to study the nutrient intake patterns of the non-vegetarian group. A similar attempt was made to investigate the variations occurring in nutrient intakes among male and female couples practising vegetarianism and non-vegetarianism (Table 2 & 4).

Table 1: Mean daily nutrient intake among vegetarians: Comparison between male and female couples

Nutrients	Males				Females			
	RDA Mean±SD	Actual intake Mean±SD	% Adequacy	P value	RDA Mean ±SD	Actual intake Mean±SD	% Adequacy	P value
Energy (Kcals)	3155.0 ±485.792	2011.0 ±286.019	64		2188.0 ±413.241	1530.0 ±407.768	70	
Protein (g)	60±0	50.3±9.347	84		50±0	45.1 ±30.769	90	
Fat (g)	25±0	29.0±4.309	145	NS	25±0	46.9 ±17.197	234	NS
Ca (mg)	400±0	915.0±327.631	228		400±0	613.2 ±156.639	153	
Iron (mg)	28±0	28.1±5.174	100		30±0	32.2 ±17.370	107	
β carotene (µg)	2400±0	1327.62±311.766	55		2400±0	1219.64 ±865.517	51	
Retinol(µg)	600±0	544.28±147.414	90	*	600±0	561.42 ±96.318	93	*
	t values-2.02 to 2.04				t values-2.02 to 2.07			

*P<0.05, **NS** -Non significant

A perusal of table 2 presents the pattern of variations in nutrient intake among males and females practising vegetarianism. The Coefficient of Variation (CV) for males was essentially similar to that of those presented in table 4. It is evident that inter individual differences in nutrient intake was essentially similar among both vegetarian and non-vegetarian diets. Since the macro nutrient intakes varied from 14-18%, variations among micronutrient were found to be varying between 18-35%. However, the CV for females was high, the inter individual differences for protein was surprisingly very high at 68% followed by fat intakes (36%). The reason for such vast differences is not clear. Among the micro nutrients, CV for β carotene and iron were high being 70% and 53% respectively. The only explanation for a high CV among females can be attributed to differences in quantity and quality of foods consumed.

Table 2: Mean daily nutrient intake among vegetarians: Comparison between male and female couples- variance and coefficient of variation

Nutrients	Males				Females			
	Mean	Variance	CV	SEM	Mean	Variance	CV	SEM
Energy (K cals)	2011.0	81807.0	14.0	49.05	1530.0	166275.2	26.0	69.93
Protein (g)	50.3	87.4	18.0	1.11	45.1	946.8	68.0	3.67
Fat (g)	29.0	18.6	14.0	0.51	46.9	295.8	36.0	2.05
Ca (mg)	915.0	107342.6	35.0	39.15	613.2	24535.7	25.0	18.72
Iron (mg)	28.1	26.8	18.0	0.61	32.2	301.7	53.0	2.07
β carotene (µg)	1327.62	97198.2	23.0	37.26	1219.64	749120.8	70.0	103.44
Retinol(µg)	544.28	21731.09	27.0	17.62	561.42	9277.31	17.0	11.51

CV- Coefficient of Variation SEM- Standard Error

Table 3 represents the data about nutrient intakes of men and women couples from non-vegetarian group. The intake pattern remained more or less similar to that of vegetarian group. A glaring deficit in calorie intake was noted in males, while females were found to meet their calorie requirements. Protein intake was also found to be more among females while males consumed just sufficient amounts to meet their requirements. The characteristic feature of the study population for high fat intake was also exhibited in this group. Among the micronutrients both men and women consumed sufficient amounts of iron and markedly higher amount of calcium while retinol intake was moderate and β carotene was drastically low. The entire exercise performed by us to analyse nutrient intake of the study population from the various aspects it is evident that fat intake was very high in all the groups. Calcium intake was more than the RDA by 1 ½-2 ½ times in all the groups. Iron intake was sufficient and none of the group studied exhibited low intakes. This is of particular references because the multitude studies reported from India have demonstrated the glaring deficit of iron intake. Hence the study group are different in this respect regardless of diet type. Iron intake was found to be satisfactory. However, β carotene was the nutrient found most limiting both among vegetarians and non-vegetarians. They consumed drastically low amounts with a mean adequacy of 48-50% among all the subjects included for in-depth study (Table 1).

Table 3: Mean daily nutrient intake among non-vegetarians comparison between male and female couples

Nutrients	Males				Females			
	RDA Mean ± SD	Actual intake Mean ± SD	% Adequacy	P value	RDA Mean ± SD	Actual intake Mean ± SD	% Adequacy	P value
Energy (Kcals)	3152.0 ±533.776	2048.0±306.406	65		2214.0±439.892	2118.0±220.919	96	
Protein (g)	60±0	50.3±6.654	83		50±0	58.5±10.650	117	NS
Fat (g)	20±0	36.4±5.275	182		20±0	68.786±18.851	344	
Ca (mg)	400±0	917.3±359.619	230	NS	400±0	696.6±161.221	174	
Iron (mg)	28±0	27.1±9.075	97		30±0	38.0±10.802	126	***
β carotene (µg)	2400±0	1148.8±600.076	48		2400±0	1755.0±202.647	73	NS
Retinol (µg)	600±0	433.428±67.560	72		600±0	435.714±77.243	72	
	t values- 2.03 to 2.05				t values -2.03 to 2.07			

***P <0.0001 & NS-Non Significant

Table 4 indicates CV for macro/micro nutrients both males and females to be was essentially similar except for fat intake. Micro nutrient intakes of males exhibited high variations; varying from 33-52%. However, micro nutrient intake in females exhibited small variations thereby the CV was 11-23%, wherein iron intake had a higher CV of 28%. It was encouraging to note a small variation in retinol intake (CV-15 & 17% for males and females). Comparing the variations in nutrient intake between vegetarians and non-vegetarians, it can be said that macro nutrient intake of females exhibited large differences (26, 68, 36 vs. 20, 18, 27 for energy, protein and fat respectively). While there were insignificant differences in CV's for males. This suggests that females from vegetarianism/non vegetarianism consumed more or less similar quantity of nutrients.

Recent Studies have shown that a high protein diet supports weight loss protein is known to reduce appetite, leading to reduced food intake [11]. Hence it could be argued that protein from sea foods and milk products contributed higher protein as well as high fat, thereby a relatively higher homogeneity in protein and fat intakes among non-vegetarians (lower CV).

Table 4: Mean daily nutrient intake among non-vegetarians: comparison between male and female couples- variance and coefficient of variation

Nutrients	Males				Females			
	Mean	Variance	CV	SEM	Mean	Variance	CV	SEM
Energy (K cals)	2048.0	133064.25	18.0	43.59	2118.0	193505.5	10.0	37.88
Protein (g)	50.3	44.28	13.0	0.79	58.5	113.43	18.0	1.27
Fat (g)	36.4	27.828	14.0	0.62	68.7	355.39	27.0	2.25
Ca (mg)	917.3	129326.3	39.0	42.98	696.6	25992.4	23.0	19.26
Iron (mg)	27.1	82.363	33.0	1.08	38.0	116.69	28.0	1.29
β carotene (µg)	1148.8	360091.9	52.0	71.72	1755	41295.21	11.0	34.75
Retinol(µg)	433.42	4564.37	15.0	8.07	435.71	5966.38	17.0	9.23

CV- Coefficient of Variation SEM- Standard Error

Conclusion

Individual food intake was obtained from the adult men and female heads of the selected families. Mean intake of energy by males and females in the vegetarian groups were 2011±286 and 1530±407.68 Kcals/day respectively and was 64 and 70% of their RDA respectively. Similarly the differences in the calorie intake among the non-vegetarians were 2048±306.406 and 2118220.919 Kcal/day the percent adequacy was 65 and 95% for men and women respectively. Among the micronutrients, calcium intake was higher in males, females consumed higher iron. β carotene although is the limiting nutrient in the diets, females consumed to their male counter parts. It helps to arrive at a better understanding in the nature of dispersion occurring in the intakes. Hence we attempted to present the data obtained with respect to nutrient intake of male and female couples.

CV for macro nutrients among both males and females was essentially similar except for fat intake. CV for micro nutrient in males exhibited high variations (33-52%) wherein iron intake had a higher CV. While there were no differences in CV's for males. This suggests that females from vegetarianism and non-vegetarianism consume more or less similarly quantity of nutrients.

A critical view of the intakes suggests that women consumed all nutrients in little higher quantities than those of their male counterparts. Among the micronutrient, β carotene and retinol intakes were very low among both men and women. Gender disparity in nutrient intake have been greatly minimised. Nutrition and health education will give a great impact on improving the overall quality of dietary intake and to overcome the deficiency disorders.

Acknowledgement

Authors grateful to all the participants for their kind cooperation during the data collection.

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