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Original Article

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Nutritional Status and Dietary Pattern of Iranian's Residing in Mysore

Abdol Hossein Azimi*, Jamuna Prakash, Prabhavathi S.N.*****

Abstract

An adequate healthy diet must satisfy human needs for energy and all essential nutrients. Adequate nutrition is the right proportion of food and nutrients needed for growth and maintenance. Food and nutrient intakes are influenced by the living environment and availability of food. Hence dietary habits can change when people travel to different country. Improved nutritional status plays an important role in the well being of individuals and is critical for socio- economic development. The aim of this study was to find out the nutritional status and dietary pattern of Iranian's residing in Mysore city, India. The methodology involved the measurement of somatic status, collecting data on food frequency and dietary intake using standardized techniques. Results indicated that 37% of males and 16% of females were obese grade II. Nearly 46% of males and 32% of females had waist hip ratio of >0.9, which is considered a risk factor for cardiovascular diseases and diabetes. Food frequency indicated that the diets were cereal based and subjects were consuming less of various fruits and vegetables. The diets were sufficient in energy and protein content. Fat intake was much higher than recommended. Calcium was also inadequate. Thiamin and riboflavin were adequate; however, niacin was lesser than needed. The antioxidant nutrients such as vitamin C and β- carotene were also inadequate. The contribution of calorie from carbohydrate sources was found to be the highest followed by fat and protein. The study brought to light some important inferences such as how a shift in dietary pattern or a migration affects the quality of diet and nutritional status.

Keywords: Body mass index; Dietary recall; Nutrient adequacy; Obesity.

Introduction

The dietary habits of Iranian adults seems to be greatly influenced by the nutrition transition, which is taking place in the country as a result of rapid changes in demography, social development as well as urbanization and industrialization. This has resulted in considerable dietary changes, which includes increased consumption of inexpensive dietary energy sources like, bread, sugar, fats and oils and reduced intake of meat, fruits and vegetables, as these are comparatively costlier. A healthy diet plays a vital role in delaying and or preventing a large number of chronic degenerative diseases.[1]

The trend towards assessing dietary nutrient quality is increasing day by day.[2] In developing countries total energy intake is the most important indicator of food security.[3] Studies report that adult Iranian men have inadequate intake of some nutrients and assessing the dietary diversity is thought to be a useful indicator of nutrient adequacy among adults.[4-8] The different ways of defining food, its consumption, and dietary observances are all thought to be governed by cultural conditions and various social contexts. For an individual, eating food is not just considered as a simple biological action. Food and its obligations are mainly governed by factors such as population, social tradition, religious beliefs, social position, gender role and aesthetics.[9-11] Each society follows different

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food styles and dietary pattern, which depends on environmental, cultural and social traditions.[12]

Migration is also one of the factor which tends to influence the individuals nutritional status. A healthy migrant effect is one which facilitates the individual to cope with the pressures associated with moving from one country to another.[13] The healthy migrant effect appears to wane with increasing length of stay in the country. Over time the lifestyle and nutritional patterns of immigrants converge towards that of the host population. Many migrant groups show a significant adoption to obesogenic behaviours (e.g. consumption of more energy dense and nutrition poor foods, as well as less physical activity), experience weight gain following migration and record higher body weights than their host country counterparts.[14-15]

The estimates of World Health Organization show that, by the year 2020, non communicable diseases will become the leading cause for approximately three quarters of all deaths in the developing world.[16] Reduced physical activities, coupled with nutrition transition are considered to be partly responsible for rising prevalence of such risk factors among the communities all over the world.[17] In recent years, this epidemiological transition has made Iranian young people prone to chronic disease in later life.[18-19] Hence, it is very pertinent to assess their dietary and nutrient intakes in relation to their somatic status. The present study was planned and conducted to evaluate the nutritional status and dietary pattern of Iranian adults residing in Mysore using a small representative sample.

Methodology

In this cross sectional study, a total of 324 individual (191-males and 124-Females) were selected randomly. The study was conducted in Mysore and approved by the Human Ethical Committee of the University of Mysore. The baseline information collected included age, gender, weight, height, education and food pattern *via* a face-to-face interview with the participants of the study. The details about the method followed for assessing the nutritional status are given below.

Anthropometric measurements

Body weight was measured using an electronic weighing balance and recorded to the nearest of 0.5 kg. The subjects were measured bare foot and wearing light clothing. Height was measured using a mounted tape and recorded to the nearest 0.5 cm. Body mass index (BMI) was then calculated as weight in kg divided by the square of height in meters. The subjects were then classified into different grades of BMI based on the WHO guidelines.[20] Body circumferences were measured to the nearest millimeter using a flexible tape. Waist circumference was taken at the end of normal expiration with the measuring tape positioned at the mid way between the lower rib and the iliac crest. Hip circumference was measured at the level of maximal protrusion of the gluteal muscles. WHR was calculated as waist circumference (cm) divided by hip circumference (cm). The cutoff points were deviced based on the study reported by Azadbakht.[21] The normal cutoff points used in this study were 0.7-0.9 and 0.7-0.8 for male and female subjects. The subjects were then categorized as normal, gluteal femoral obese and abdominal obesity based on the cutoff ranges of 0.7-0.8, 0.8-0.9 and >0.9. The mid-upper arm circumference measurement was taken on the left hand. The mid-point between the tip of the acromion of scapula and the tip of the olecranon process of the ulna, with the arm flexed at the elbow at right angle. The reading was taken to the nearest millimeter. The recorded measurements were compared with the standards for computing the percent standard of MUAC.[22]

Dietary assessment

Dietary assessment was done using food frequency and dietary intake survey by 24 hr

recall. Twenty four hour dietary recall interview was used to estimate the nutrient intake. During the interview the respondents were asked to report and recall the amount of food they had consumed in a day. Portion sizes of consumed foods were converted to grams using household measures and the nutrient content of the foods were computed using food composition tables for Indian foods.[23] The percent adequacy of nutrient intake was determined using the United States recommended dietary allowances.[24]

For evaluating the frequency of consumption of various foods, a food frequency questionnaire was used. The food frequency questionnaire consisted of a list of foods, and participants were asked to report their frequency and amount of intake of each food item. The data obtained was computed as mean number of times a food was consumed in a day by subjects.

Statistical analysis

Data were analyzed and reported as mean ± SD for all measurements using a software on computer. Levels of significance between genders were measured using t-test and chi-square test.

Results

Information on the general profile of the study population is presented in Table 1. The age wise distribution of subjects showed that majority (42% and 34%) of male and female subjects were between the age group of 25-30 years. A considerably higher percentage (79% and 85%) of subjects from both male and female were pursuing undergraduate courses, 47% of males and 58% of females were reported to be in postgraduate courses, and 39% of males and 19% of females were pursuing doctoral degrees. Around 42% of males and 40% females were unmarried and the rest were married.

The mean anthropometric measurements of subjects given in Table 1 show that among males the mean height was almost similar in all the age groups ranging from 173.6±8.2 to 178.5±6.6 cm. A slightly higher mean body weights were recorded in the age group of 20-

Table 1: General information and mean anthropometric measurements of subjects

Parameter	Category	Age (Years)							
		Males (N=199)				Females (N=125)			
		20-25	26-30	31-35	36-40	20-25	26-30	31-35	36-40
Number of subjects		37 (18)	68 (34)	53 (27)	41 (21)	35 (28)	53 (42)	20 (16)	17 (14)
Educational level	Under-graduates	22 (11)	3 (2)	1 (1)	-	22 (18)	5 (4)	1 (1)	-
	Post-graduates	15 (8)	51 (25)	10 (5)	18 (19)	13 (10)	44 (35)	10 (8)	5 (4)
	Doctoral degree	-	14 (7)	42 (20)	23 (12)	-	3 (2)	9 (7)	12 (10)
Marital status	Married	4 (2)	15 (8)	28 (14)	35 (18)	6 (5)	21 (17)	15 (12)	8 (6)
	Un married	33 (16)	53 (26)	25 (13)	6 (3)	29 (23)	32 (26)	5 (4)	9 (7)
Somatic status	Mean Height (cm)	177.7 ±5.4	178.5 ±6.6	176.7 ±5.5	173.6 ±8.2	163.4 ±6.3	164.6 ±6.2	162.6 ±4.4	160.3 ±6.2
	Mean weight (kg)	82.8 ±17.1	76.2 ±11.8	78.6 ±12.2	78.6 ±13.3	57.4 ±9	60.7 ±10.5	57.4 ±8.8	67.3 ±7.4
	MUAC (cm)	30.8 ±4.2	29.8 ± 3.2	30.7 ± 3.2	30.8 ± 4.0	25.2 ± 4.2	26.9 ± 4.1	25.9 ± 2.1	29.4 ± 3.3
	WHR (cm)	0.85 ±0.08	0.86 ±0.06	0.88 ± 0.55	0.90 ±0.05	0.79 ±0.05	0.80 ±0.06	0.79 ±0.05	0.83 ±0.05

Table 2: Subjects classified according to nutritional status (percent of subjects)

Indicators	Age (Years)							
	Males (N=199)				Females (N=125)			
	20-25	26-30	31-35	36-40	20-25	26-30	31-35	36-40
BMI grading								
17-18.5	-	-	-	-	4	4	-	-
18.5-20	1	2	3	-	7	8	7	-
20-25	10	19	6	11	15	26	6	7
25-30	4	11	14	8	2	6	2	6
30-35	4	3	2	2	-	-	-	-
X^2	**0.008****							
Waist-hip ratio								
0.7-0.8	4	6	3	2	18	18	8	3
0.8-0.9	11	17	16	9	10	25	8	10
>0.9	4	10	8	10	-	-	-	-
p-value	**0.0001*****							
MUAC (percent of standard)								
70-80	-	-	-	-	6	6	-	-
80-90	3	4	2	3	11	8	8	-
>90	15	30	24	18	10	29	8	14
p-value	**0.0001*****							

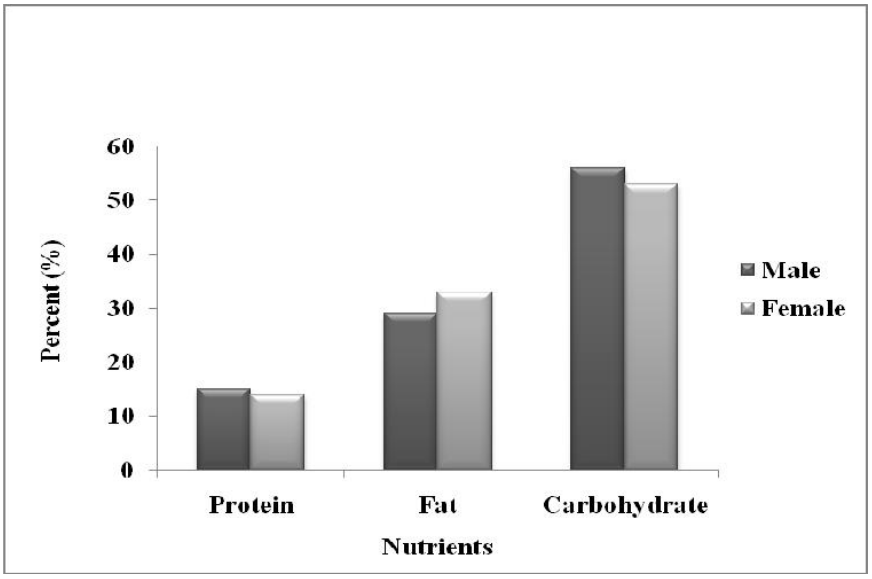
Table 3: Food frequency categorized as mean number of subjects using daily

Food group	Frequency of use		Food group	Frequency of use		Food group	Frequency of use	
	Male	Female		Male	Female		Male	Female
Cereals			**Vegetables**			**Fruits**		
Rice	165	98	Onion	185	111	Banana	102	63
Wheat	145	97	Tomato	139	89	Orange	69	48
Maize	13	8.9	Potato	102	89	Mango	41	36
Barley	12	7	Cucumber	97	89	Grapes	42	23
Oat	4.2	2.9	Eggplant	92	69	Apple	33	21
Pulses			Carrot	51	43	Pineapple	27	21
Bean	26	18	Mint leaves	44	32	Pomegranate	17	13
Peas	22	15	Cabbage	39	24	papaya	15	12
Wax bean	21	14	Lettuce	30	21	Pear	8	7
Lentil	20	14	Mushroom	22	17	Peach	6.7	5.5
Chick pea	19	11	Turnip	1	1.4	Strawberry	0.4	1.7
Broad beans	6	4	**Snacks and ready to eat food**			**Beverages**		
Animal Foods			Sweets	71	65	Tea/ coffee	172	108
Beef	130	101	Honey	68	45	Soft drink	112	64
Chicken	84	44	French fries	44	44	Energy drink	19	8
Goat meat	64	31	Biscuit	40	38	**Dry fruits & nuts**		
Fish	29	13	Cake	40	31	Date	47	43
Shrimp	8	5	Jam	31	27	Coconut	45	43
Egg	75	31	Macaroni	28	21	Walnut	42	26
Milk & milk products			Noodles	24	18	Peanut	23	24
Yogurt	127	84	Soup	22	16	Pistachio	23	20
Milk	116	72	Peanut butter	15	14	Almond	21	17
Cheese	96	72	Corn flakes	10	12	Hazelnut	12	5
Butter	47	31	Nuggets	12	7	Fig	6	7
Ice cream	27	19	Pizza	9	6	-	-	-
-	-	-	Jelly	6	6	-	-	-

Table 4: Mean nutrient intake of subjects per day and nutrient adequacy

Nutrients	Age in years								P-Value
	Male				Female				
	20-25	26-30	31-35	36-40	20-25	26-30	31-35	36-40	
Protein (g)	74 ± 15.8 (133.2)	74 ±16.7 (133.3)	79 ± 20.6 (141.2)	82 ± 16.1 (146.6)	61 ±17.1 (133.6)	64 ± 19.1 (140.1)	71 ±16.1 (155.3)	62 ±20.0 (136.0)	0.0001***
Fat (g)	67 ±22.7 (94.5)	61 ± 22.2 (86.9)	68 ±24.5 (98.1)	64 ±19.9 (93.7)	69 ± 23.0 (122.6)	64 ±25.3 (112.3)	72 ± 20.5 (129.2)	58 ± 24.4 (105.1)	0.625NS
Dietary fibre (g)	20.5 ± 10.1 (54.0)	18.1 ±7.2 (47.8)	17.9 ±8.55 (64.1)	23.2 ± 15.9 (92.9)	16.5 ± 4.9 (66.2)	16.9 ± 8.3 (67.9)	15.3 ±6.2 (61.3)	19.6 ±10.2 (78.7)	0.018**
Energy (kcal)	3063 ± 481 (101.7)	3890 ± 496 (93.8)	3133 ± 516 (107.4)	3029 ±373 (106.2)	2492 ±312 (105.4)	2265 ±423 (95.8)	2439 ± 238 (105.7)	2480 ± 275 (110.1)	0.0001***
Calcium (mg)	428± 185.7 (42.9)	448± 190.2 (44.9)	443± 185.3 (44.4)	478 ± 194.6 (47.9)	401± 180.6 (50.9)	473± 184.8 (58.7)	473± 190.9 (55.0)	408 ± 179.0 (50.8)	0.001**
Iron (mg)	10.3 ± 2.1 (127.7)	9.8 ±2.2 (121.3)	9.1 ± 2.4 (111.9)	10.5 ± 1.7 (130.8)	15.5 ±6.3 (86.4)	14.6 ± 4.7 (81.5)	14.3 ± 2.5 (79.8)	13.1 ± 4.2 (73.1)	0.0001***
Thiamin (mg)	1.34 ±0.1 (111.1)	1.30 ± 0.17 (108.3)	1.23 ± 0.12 (102.3)	1.24 ±0.10 (103.2)	1.22 ±0.18 (110.3)	1.24 ±0.15 (112.2)	1.19 ±0.15 (108.4)	1.15 ±0.12 (104.6)	0.0001***
Riboflavin (mg)	1.32 ±0.13 (101.4)	1.36 ± 0.11 (103.7)	1.35 ± 0.13 (103.6)	1.26 ±0.14 (96.6)	1.08 ± 0.06 (98.2)	1.16 ± 0.13 (105.0)	1.27 ± 0.15 (115.2)	1.25 ± 0.26 (112.9)	0.0001***
Niacin (mg)	16.3 ± 3.3 (102.0)	16.4 ± 2.59 (102.4)	14.2 ± 2.1 (88.2)	14.7 ± 1.5 (91.7)	11.3 ± 2.8 (81.1)	10.1 ± 1.99 (71.9)	12.0 ± 1.45 (86.3)	12.9 ±1.66 (92.3)	0.0001***
Vitamin C (mg)	100 ±19.5 (111.9)	103 ± 24.7 (114.2)	94 ±27.3 (103.9)	114 ±27.1 (126.6)	87 ± 12.0 (115.3)	104 ± 23.2 (138.9)	105 ± 27.5 (139.1)	89 ±29.2 (118.7)	0.077NS
B- Carotene (µg)	886 ±304 (98.4)	786 ±333 (87.1)	810 ±298 (82.4)	726 ±276 (92.3)	817 ±349 (78.6)	785 ±424 (85.2)	686 ±363 (68.9)	955 ± 553 (75.1)	0.958NS

Fig 1: Percent calorie contribution from different macronutrients



25 years (82.8±17.1 kg). Among females the mean height was in the range of 160.3±6.2 to 164.6±6.2 cm. A higher mean body weights were noticed for subjects in the age group of 35-40 years (67.3±7.4 kg). With increasing age a steady increase in the mean body weight gained was also observed among the study group.

The somatic status of subjects is shown in Table 2. Distribution into different grades of nutritional status based on body mass index (BMI) indicated that 8% of females were suffering from chronic energy deficiency. Six percent of males and 22% of females had normal body mass index. Forty six percent of males and 54% of females were shown to have obesity grade I, whereas 37% of males and 16% of females belonged to grade II obesity. Waist - hip ratio (WHR) indicated that a relatively equal percentage of subjects belonging to male and female category had normal WHR ranges. A considerably high percent of males (32%) had WHR >0.9. The classification of MUAC as standard percent showed that 87% of males and 61% of females belonged to >90% of standard category. Only 12% of females between the age group of 20-30 years had a lower MUAC in the category of percent standard of 70-80%.

The food frequency data of subjects computed as average intake per day is given in table 3. Food frequency revealed that the major cereal consumed was rice followed by wheat. Maize was consumed to a lesser extent and other cereals were rarely used. Among legumes, use of beans, peas, and lentil was very common; others were used very rarely which indicates a poor dietary diversity. Among vegetables, tomato, potato, onion and egg plant were used by almost all the subjects. Others were hardly used by the study population. Fruit consumption was found to be moderate in both the groups. Beef, chicken and goat meat were commonly consumed by both the groups. Among the beverages tea, coffee and soft drink consumption was found to be very high among males. Dry fruits and nuts intake was shown to be in moderation. Milk and curd were commonly consumed products. Processed foods like biscuit, cake, and macaroni fell in the average use category.

Dietary intake of subjects was determined using 24hr recall method of survey. Table 4 presents the mean nutrient intake of all subjects. The mean protein intake was found to be sufficient. The highest protein intake was observed in the age group of 35-40 years among male subjects (82 ± 16.1g/day). Among females it was 71±16.1g/day in the age group of 30-35 years. Fat intake was found to be much higher and highest intake was seen in the age group of 30-35 years for both male and female subjects (68 and 72 g/day). Fiber intake was found to be satisfactory for both the groups. The mean energy intake for males ranged between 3029±373 Kcal to 3890±496 Kcal. Among females it was 2265±423 Kcal to 2492±312 Kcal. Calcium intake was found to be much below the recommended level for both male and female subjects which was in the range of 428±185.7 to 478±194.6 and 401±180.6 to 473±190.9 mg/day. Iron intake was found to be low among male subjects whereas for females it was satisfactory. The intake of thiamin, riboflavin and niacin were found to be adequate. The intake of vitamin C was found to be much higher than recommended allowances. â-carotene intake was lower which ranged from 726±276 to 886±304 for males and 686±363 to 955±553 µg/100g for females. Statistically significant differences were noted for the intake of protein, fiber, energy, calcium, iron, thiamin, riboflavin and niacin among the genders.

The analysis of percent adequacy of nutrients showed that the both protein and energy consumption was above the recommended level which ranged between 133.2 to 146.6% of protein for males and 133.6 to 155.3% for females, energy intake was found to be in the range of 93.8 to 107.4% for males and among females, it was 95.8 to 110.1%. Fat intake was more in all the subjects. Among all the nutrients, calcium consumption was found to be the least for all the age groups for both male and female subjects (42.9 to 47.9% and 50.8 to 58.7%). Iron consumption was satisfactory for both the groups which

accounted for 130.8% among males. Thiamin and riboflavin were consumed in adequate quantity by both the groups. Vitamin C consumption was higher than the recommended. Retinol adequacy was found to be marginal. The lowest (68.9%) adequacy level was observed in the age group of 30-35 years of females

It was worthwhile to examine the contribution of macronutrients protein, fat and carbohydrate to the energy intake of subjects to understand the composition of their diets. The mean percent contribution of protein, fat and carbohydrate to the total energy intake of subjects is presented in Fig 1. It is evident from the figure that among the three nutrients the highest energy was contributed by carbohydrate followed by fat and protein for both the groups. The calories contributed by protein, fat and carbohydrate were 16%, 29% and 56% for males and 14%, 33% and 53% for females respectively. It can be seen that fat calories were very high in the study subjects and they need to reduce the intake of fat in their diets.

Discussion

The prevalence of obesity is on the rise in developing countries like Iran, which might be possibly due to the involvement of various environmental factors such as socio- economic status, physical activity level and dietary pattern. Of all these educational level may also play a role in obesity through shaping the knowledge of individuals about diet, physical activity and their consequences on health status.[25] The negative association of obesity may therefore be related to a low level of knowledge among individuals about the intake of balanced meals in day-to-day living.[26] Body mass index (BMI) is a method used to measure a person's percent body fat. Accumulation of excess fat in the waist area increases the risk of having high blood pressure, cholesterol, diabetes, cardiovascular diseases and stroke.[27] In our study as we can see from the results, it is evident that with increasing age there is a gradual increase in mean body weight especially among women. This is an indication that the risk of obesity increases with aging if there is no consequent reduction in the energy intake as most of them prefer to be sedentary. Our results are consistent with the findings of Seidell[28] who reported that women show generally higher obesity prevalence than men especially after 50 years of age.

Waist-hip-ratio (WHR) is used to measure the distribution of person's body fat. WHR is a very good indicator of abdominal obesity which percentage can be considered as an independent predictor of cardiovascular diseases, morbidity and subsequent mortality.[29] Since a considerably higher percentage of subjects, both male and female were suffering from grade I and II obesity, it can be inferred that they are at the higher risk for developing degenerative diseases. Chi-square test was performed to check the degree of association of BMI for various age groups. Statistically significant association was noted between the groups. Similarly for WHR and MUAC, t-test showed statistically significant difference ($p< 0.0001$).

Several studies have reported that a shift from a monotonous diet to a more diverse diet has been shown to increase energy and micronutrient intakes especially in developing countries.[30-33] Intake of a diverse range of foods has been a recommendation for achieving adequate nutrient intake.[34] The results of the study indicated that the diets were adequate in energy and protein content. The energy density of the diet could also be associated with healthy or unhealthy characteristics of the diets. Energy dense diets have been reported to contain higher amounts of fat, refined grains and added sugars, but lower amounts of fruits and vegetables, whole grains and dietary fiber which are associated with unhealthy food choices.[35] However, fat was found to be much higher. The high fat intake could be attributed to the higher intake of meat and meat products, various processed foods and dairy products.

Dietary calcium intake especially from dairy products has been shown to have a protective effect on overweight and obesity.[36-39] Since all the study groups showed a lower intake of calcium it can be inferred this could be one of the reasons for the prevalence of higher mean body weights and BMI. Vitamin A intake was below the recommended level. Most of the vitamin A intake comes through carotenoids consumed through vegetables and fruits. Since the study population showed a lower consumption of green leafy vegetables and other vegetables, their carotene intakes were also found to be low. Adequate consumption of fruits and vegetables has a prominent role in weight management probably because their consumption decreases energy density, promotes satiety and decreases energy intake. [40] The Vitamin C intake would possibly be contributed by the consumption of fruit juices. Thiamin and riboflavin are shown to be adequately consumed by all the age groups as cereals are the richest sources of these nutrients and since the diets were predominantly cereal based, the intakes were sufficient.

It was interesting to analyze the percent contribution of calories form various macronutrients. For both male and female subjects, the calories contributed by carbohydrate was almost similar and fat calories were very high indicating a high fat intake. A higher intake of protein, fat and carbohydrate would have contributed to the higher energy intake among both group of subjects.

Conclusion

The extent of dietary change after migrating to another country would depend upon the place of origin, time of migration as well as extent of exposure to host country. In the present study it was observed that the subjects were more dependent on the processed food rather than home prepared foods. This might be due to the lack of time and adequate resources to prepare and serve themselves. Adopting diverse foods in the diet is important to obtain the beneficial effect of protective nutrients. An awareness programme about the judicious selection of foods is necessary for such category of individuals for maintaing health and well being, nutrient adequacy and quality of the diets.

Acknowledgement

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Original Article

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Bye Bye Junk Food

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Abstract

Junk food is a derisive slang term for food that is of little nutritional value and often high in fat, sugar, salt, and calories. It is widely believed that the term was coined by Michael Jacobson, director of the Center for Science in the Public Interest, in 1972. Junk foods typically contain high levels of calories from sugar or fat with little protein, vitamins or minerals. Foods commonly considered junk foods include salted snack foods, gum, candy, sweet desserts, fried fast food, and sugary carbonated beverages. Many foods such as hamburgers, pizza, and tacos can be considered either healthy or junk food depending on their ingredients and preparation methods. The more highly processed items usually falling under the junk food category. What is and is not junk food can also depend on the person's class and social status, with wealthier people tending to have a broader definition while lower-income consumers may see fewer foods as junk food, especially certain ethnic foods. Despite being labeled as "junk" consuming such foods usually does not pose any immediate health concerns and is generally safe when integrated into a well balanced diet.

Keywords: Junk food; Children; Mental and physical effects.

Introduction

Today junk food eating is very common in all parts of world irrespective of economical status of family. Initially ignored aspect has entered into depth of everyone's health especially child population. This junk food has many side effects on children in physical as well as mental health.

In India and most of the countries, junk foods are not defined in proper manner so the question comes then how to say no to these food items. This junk foods are advertised continuously in all types of medias and available at door reach to children including school campus.

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Michael Jacobson was first who coined junk food (empty calorie) terminology. He was born on 29th July 1943. He was an American scientist and nutritional advisor. He studied that Soda is essential junk food with just sugar calories and no nutrients. Most of Americans are drinking soda with average two cans of soda a day and these soft drinks contributes to obesity and tooth decay in teenagers. In 2005, Jacobson's organization proposed mandatory warning labels on all containers of sugar-sweetened soft drinks, to warn consumers about the possible health risks of consuming these beverages on a regular basis.[1]

Definition

Junk food is defined as the food that having little nutritional value and high fat, sugar, salt, and calories. Junk foods typically contain high levels of calories from sugar or fat with little protein, vitamins or minerals. Foods commonly considered junk foods include salted snack foods, gum, candy, sweet desserts, fried fast food, and sugary carbonated beverages. Many foods such as hamburgers, pizza, and tacos also be considered junk food depending on their ingredients and preparation methods.[2]

Some of the examples of Junk Foods are as follows:

- Soda
- Fried chicken
- Egg and sausage sandwich
- Bacon cheeseburger
- French fries
- Milk shake
- Deep fried cheese sticks
- pizza
- Cheese cake
- Hot dog
- Burgers
- Candies
- Sugary Cereals
- Samosas
- Carbonated Beverages
- Ice-Creams
- Creamy Cakes
- noodles
- kurkure

Bye-bye

- *Obesity:* Junk food has a major role in the obesity epidemic. Obesity increases your risk for cardiovascular disease.
- *Diabetes:* Eating junk foods throughout the day causes chronically high insulin levels, resulting obesity and Type 2 diabetes mellitus.
- *Depression:* Hormonal changes at puberty make teenagers more susceptible to mood and behavioral swings. A healthy diet plays a part in keeping hormone levels at normal level. while a diet high in junk food falls short of these requirements. Consuming trans fats, saturated fats and processed food is associated with up to 50% increase in risk of depression.
- Nutrient Deficiencies lead to low in energy, mood swings, sleep disturbance and poor academic achievement.
- *Sodium:* High sodium in junk foods is a contributing factor in high blood pressure and heart, liver and kidney diseases
- *Overeating:* Junk foods are low in satiation value leads to overeating.
- Junk food doesn't contain nutrients for healthy body leading to chronic fatigue.
- Because fast food and junk food don't contain adequate amounts of protein and good carbohydrates, blood sugar levels drops suddenly leading to fatigue.
- short term eating of too much junk food also leads to mood swings and constipation.

One important study done at Deakin University in Australia, studied 23,000 mothers which was published in the Journal of the American Academy of Child and Adolescent Psychiatry. These researchers found that mothers who eat junk food during pregnancy more likely to have children with mental health problems like Depression, Anxiety, Conduct disorder, attention-deficit hyperactivity disorder etc.

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Original Article

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Corrosive Acid: An Uncommon Suicidal Poison

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Abstract

Deaths from corrosive substances are uncommon in day to day medicolegal practice. We report a case of death due to ingestion of sulphuric acid with history of depression and previous suicidal attempt. He was provisionally diagnosed of acid ingestion but there was no history either from patient or from his relatives. Guidance and education are important preventive tools, but the best approach is to restrict access to corrosive agents, by prohibiting their free commercialization.

Keywords: Chalky white teeth, Trickling lines, Corrosive acid, Utensil cleansing business.

Introduction

- Corrosive poisons are those substances which corrode & destroy the tissues through direct chemical action.
- Deaths from corrosive substances are uncommon in day to day medico legal practice.
- We report a case of death due to ingestion of sulphuric acid with history of depression and previous suicidal attempt.
- He was provisionally diagnosed of acid ingestion but there was no history either from patient or from his relatives, as patient was alone at home at the time of incidence.
- Diagnosis was confirmed only after autopsy report.

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Case report

- A 27 yrs old healthy married male was average built & nourished with history of depression & previous suicidal attempt.
- Occupationally, his family was engaged in utensil cleansing business.
- On one evening, he was alone at home & consumed about 150 ml sulphuric acid. Then neighbors brought him at district hospital at 6.15 pm.
- After primary treatment subject referred to medical college hospital at 6.45 pm but reached at medical college hospital at 9.30 pm in condition of shock and expired at 9.40pm.

Autoposy report

The postmortem done after 12 hours of death.

External findings

- The cloths are stained with brownish – blackish spots at places.
- Rigor mortis present all over the body.
- PM staining was present on dependent parts except the pressure points.
- Mouth was semi opened. Dusky whitish dried froth was present at opening of mouth. There was inflammation &

excoriation of mucosa of lips. There was blackening of oral mucosa with blackish tongue. occlusal surface of upper central & lateral incisors were chalky white. Trickling lines from lower lip to chin was present.

- A superficial acid burn area (brownish in colour) of size 5x4cm, with trickling lines towards the fingers were present on dorsum of left hand medially.

Internal findings

1. Skull, Brain,Thorax-Healthy
2. Larynx & trachea- blackish mucosa present.
3. Abdomen

- *Stomach* - converted into blackish ,soft mass with a perforation of size 4x3 cm, present at lower part of body. mucous membrane diffusely blackish in colour.
- *Peritoneum* - blackish coloured material about 250 ml present in the peritoneal cavity left side mesentry adjacent to stomach & dependant parts of peritoneal cavity & dependant abdominal visceras stained with blackish coloured material.
- *Liver, spleen, kidneys* - are congested.
- *Bladder* - healthy & contains urine.
- *Pharynx & oesophagus* – blackish coloured mucosa present. No perforation of oesophagus was seen.
- *Small intestine* - blackish coloured mucosa.
- *Large intestine* - internally healthy. Externally wall stained with blackish material.

FSL report

Confirm the presence of sulphuric acid.

Final opinion

The cause of death was given shock as a result of gastric perforation, due to ingestion of sulphuric acid.

Left hand acid burn area

Dusky white dried froth with trickling lines

Inflammation of lips & chalky white teeth

Blackish soft stomach mass with perforation

Discussion

- Within the adult population, suicidal intentions are recognized as the commonest cause of sulfuric acid ingestion as was in this case.[1]
- Sulphuric acid ingestion will lead to death by rapid cardiovascular collapse or shock Secondary to gastrointestinal tract rupture related chemical peritonitis.[2]
- It is reported that the squamous epithelium of oesophagus is relatively resistant to acid burns, while the columnar epithelium of stomach is much more frequent than perforation of oesophagus.[3]
- In 1927, a mohammedan male, 30 yrs, swallowed a quantity of a mixture of sulphuric acid & nitric acid after murdering his wife and child & died within 18 hours.[4]
- The fatal dose is 5-10 ml & fatal period 12-24 hrs.
- The ease of availability of acid because his family business contributed to selection of this mode of attempting suicide.
- Individuals who attempt suicides by ingesting acid are typically conscious and lucid during the process, and as a result, concomitant aspiration pneumonia rarely occurs. When it occurs, it greatly increases the likelihood of death.[5]

Conclusion

Sulphuric acid is uncommonly used as suicidal poison. But in the present case subject was suffering from depression as per history & also history of previous suicidal attempt subject was alone at home & consumed a large quantity of acid.

These above findings suggest that it is a case of suicidal poisoning.

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Original Article

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Impact of Nutrition Education of Parents of Preschool Children on Quality of Packed School Lunch

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Abstract

The objective of the study was to assess the quality of packed school lunch given to pre-schoolers for its nutritional value and to assess the impact of nutrition education to parents to improve the nutritional quality of the lunch. Children (n=70, with control and experiment groups, 35 each) from 3 schools in Mysore city were part of the study. The study was conducted using a pre-test post-test model. At the pre-test level the nutritional intake of a sub-sample of children (n=20) was assessed by 24 hour recall method. The nutritional quality of lunch boxes was assessed by 5 day weighment survey. An intervention of a nutrition education program was applied to the parents of the experiment group based on observational learning; nutrition knowledge scores were assessed using a standardized questionnaire. The impact of the education program was assessed at the post-test stage, studying the nutrition quality of school lunch boxes after the program. Results indicated that the diets of the children in the pre-test stage were adequate in protein and fat but inadequate in energy and micronutrients. Educational intervention resulted in increased dietary diversity in the lunch boxes with increased presence of fruits and vegetables. The post-test nutrition knowledge questionnaire showed an improvement in knowledge scores. The educational program had a positive impact on the nutrition quality of school lunch boxes of preschoolers.

Keywords: Dietary diversity; Food frequency; Nutrient intake; Nutrition knowledge.

Introduction

Food habits have a strong influence on childhood obesity.[1] Behaviours linked to unhealthy weight gain *viz.* food preferences, eating habits, exercise set in during early childhood before commencing regular school.[2-3] According to the World Bank, children between ages 0-8 years are most vulnerable for nutrition related development disorders impairing both their growth and cognition; this in turn affects their future earning potential. Ergo, pre-school is an ideal age to apply behaviour modification techniques for better health, lower the risk of overweight and obesity and provide optimum nutrition for required cognitive development. The school environment is a very useful area to teach and influence the food behaviour of children.[4-5] Parental feeding behaviours have a major impact on children's eating behaviour.[6] Most nutrition education programs have a single component approach of improving fruit and vegetable consumption in children and not a composite approach for the entire diet.[7-9] Parents are directly involved in daily food selection and support their children's food choices. Studies have proven that it is nutrition education which is critical for parents of pre-schoolers and not just having accumulated nutrition knowledge from allied sources, which will help their child achieve a balanced diet.[10] Nutrition education to families yielding a positive result in the nutrition intake of pre-school children has been established in the Indian context since the 80's[11]; the impact of better nutrition on cognition of pre-schoolers were seen by

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researchers in the USA at the same time.[12] Studies continue to indicate an emphatic positive association between parent's nutrition knowledge and children's nutrition intake.[13-15]

The present study encompassed a comprehensive nutrition education program for parents with special focus on school lunch boxes. The essential aim was to assess the nutrition quality of lunch boxes sent to school, and educate parents prompting auto-suggestion due to structured nutrition knowledge which in turn improves the nutrition quality of the lunch box comprehensively. Since children sit together and eat their school lunch, it is also an ideal time for the group to self-motivate itself into healthier food choices which can become habitual over the school years.

Materials and Methods

Sample

Children (4 to 6 years) were selected by random sampling from three pre-schools in urban Mysore (n=70). Parents were enrolled for the program upon invitation via the school for an introductory program by the researchers. Parents who signed the consent form to participate and attend the education program were classified into the experiment group; parents who preferred to not attend the education program but consented to their child's participation in the program formed the control group.

Data collection

A pilot tested and standardized, multiple choice questionnaire comprising of 25 marks; was used to assess nutrition knowledge scores. The questions spanned general nutrition needs of growing children, specific attention areas for pre-schoolers and family life style practices. The nutrition education program covered all topics in the questionnaire. A calibrated weighing balance (Docbel Braun) was used to weigh the food sent in the school lunch box by parents for 5 continuous days. A cross-sectional 24 hour dietary recall of the children's dietary pattern was recorded on interviewing the parents using standard tools and techniques[16]. The data was collected during mid-week for two consecutive days at the baseline stage and converted to nutrients using the food composition tables.[17] Percent adequacy of diets was computed using the recommended dietary allowances for Indians.[18]

The nutrition education program was conducted for parents from the experiment group.

Intervention

The education spanned basic nutrition for growth, healthy lunch box options, introducing new foods to children, controlling selection on unhealthy foods and a display of prepared lunch boxes and an age appropriate balanced meal. The education program was supported by a multimedia presentation, charts, photographs and take home material.

Follow up

After the follow up period of three months, the food behaviour and snack box quality was re-assessed for the experiment and control groups. Nutrition knowledge scores were re-assessed for parents of the experiment group.

Results

The results of the study are compiled in Tables 1-4. Average nutrition knowledge scores showed similar nutrition knowledge between parents of the control and experiment groups. In the post-test data of the experiment group, there was a percentage improvement in the nutrition knowledge scores (33.56%); reduction in the number of wrong answers (-72.30%) and the number of unanswered questions (-46.43%) was seen (Table 1). This indicated the positive impact of nutrition education on the knowledge level of parents.

Table 1: Nutrition knowledge scores of parents at baseline (experiment and control groups) and post-test level (experiment group)

Group	n	Phase	Nutrition knowledge scores		
			Number correct	Number wrong	Number left unanswered
Control	35	Pre-Test	16.4	6.8	3.07
Experiment	35	Pre-Test	17.37	6.5	2.8
Experiment	35	Post-Test	23.2	1.8	1.5
Improvement in knowledge scores in experimental group (%)			33.56	-72.30	-46.43

Table 2: Nutrient intake profile of subjects (n=20): Mean daily intake, percent adequacy and contribution from packed lunch

Nutrients	Daily Nutrient Intake	Desirable Dietary Intake*	Percent Adequacy (Excess or deficit)	Nutrient contribution from packed lunch per day [mean of 5 days]
Protein (g)	25.6	20.1	+ 27.3	4.05 ± 1.86
Fat (g)	24.7	30.0	-17.7	4.39 ± 3.21
Energy (Kcal)	766	1350	-43.3	178.0 ± 69.9
Calcium (mg)	524	600	-12.7	36.0 ± 70.16
Iron (mg)	5.51	13.00	-57.62	1.11 ± 0.79
Carotene (µg)	784	3200	-75.50	162 ± 64.0
Thiamine (mg)	0.57	0.70	-18.57	0.12 ± 0.08
Riboflavin (mg)	1.19	0.80	+ 48.75	0.46 ± 0.03
Niacin (mg)	4.26	11.0	-61.27	1.06 ± 1.02
Vitamin C (mg)	18.07	40.00	-54.83	4.93 ± 3.99

*: Based on Recommended Dietary Allowance, (ICMR, 2010).

The nutrient intake profile of subjects is presented in Table 2. The table compiles data on mean daily nutrient intake determined by 24 hour recall, excess or deficit of nutrients calculated as percent and nutrient contribution from the packed lunch. The nutrient intake data indicates that the subjects were obtaining protein (27.3%) and riboflavin (48.8%) requirements for the day through the diet. However, there were deficits in the consumption of fat, energy, calcium, iron, carotene, thiamine, niacin and Vitamin C. The overall nutrient content of the diet indicated poor dietary diversity. The average nutrient content of the school lunch box of the sample indicated limited diversity of fruit and vegetables and a very limited contribution toward vitamins and minerals intake.

Table 3 indicates data on the frequency of lunch sent to school. The dishes were categorised into various food groups. Cereal components in a school lunch box need to have the attributes of being easy to pick and eat by the child. All school lunch boxes in both groups always had a cereal based food present in it. In the post-test level, there was an increase in the consumption of chapatti (19%). The control group showed an increase in the consumption of poori (10.9%) and aloo parantha (11.1%). It is interesting to note the reduction in the consumption of processed noodles was greater in the experiment group (12.8%) compared to the control group (3.7%). Accompaniments are a significant part of the school lunch box to complement the cereal based foods present. The pre-test data showed a frequency of tomato+onion chutney, coconut chutney, jam, sugar, potato gravy and sambhar to be used often by both experiment and control groups. In the post-test level, the experiment group showed improved consumption of vegetable based accompaniments, viz. Tomato+onion chutney (10.7%), green leafy vegetables (6.2%), sautéed cabbage (6.2%), sautéed beetroot (6.2%). Honey was used in the experiment group in the post-test level (12.5%) and not used at all in the control group. Fruits and vegetables formed a part of the school lunch

Table 3: Frequency of dishes in the school lunch box (mean of 5 days, in %)

Food Group	Foods	Control Group (n=35)		Experiment Group (n=35)	
		Before	After	Before	After
Cereal based foods	Chapati	62.8	22.2	56	75
	Vegetable Upma*	--	--	4	12.5
	Plain Upma	22.8	27.7	16	31.2
	Rotti	8.5	11.1	16	--
	Poori	5.7	16.6	--	12.5
	Dosa	68.5	11.1	88	43.7
	Idli	45.7	--	56	43.7
	Lime Rice	14.2	22.2	4	6.2
	Vegetable Pulao	17.1	5.5	12	6.2
	Pongal	--	11.1	--	12.5
	Kesari Bhat**	2.8	11.1	4	6.2
	Noodles	31.4	27.7	44	31.2
	Aloo Parantha***	--	11.1	4	--
Accompani-ments	Tomato and Onion chutney	14.2	16.6	8	18.7
	Coconut chutney	40	11.1	37.1	34.5
	Jam	20	16.6	20	31.5
	Sugar	31.4	--	24	12.5
	Potato Gravy	14.2	11.1	--	12.5
	Green leafy veg	--	--	--	6.2
	Sautéed cabbage	--	--	--	6.2
	Sautéed beetroot	--	--	--	6.2
	Honey	--	--	--	12.5
Fruits and vegetables	Grapes	40	44.4	52	37.5
	Apple	14.2	22.2	8	18.7
	Papaya	--	5.5	12	12.5
	Sapodilla	--	16.6	16	37.5
	Banana	11.4	16.6	16	37.5
	Orange	8.5	11.1	16	6.2
	Watermelon	--	--	--	18.7
	Carrot	8.5	--	4	12.5
Snacks	Bread Jam	60	88.8	16	37.5
	Cake	20	16.6	20	6.2
	Chips	40	33.3	64	75
	Biscuits	14.2	33.3	88	12.5
Nuts	Cashew	--	11.1	--	12.5
	Pista	2.8	--	--	6.2

*: Breakfast dish prepared with wheat semolina. **: Sweet dish prepared with wheat semolina. ***: Unleavened bread stuffed with potato.

box in both experiment and control groups. Grapes, apples, banana and carrot formed regular inclusions into the school lunch box. In the post-test level, there was an increase in the inclusion of sapodilla (21.5%), banana (21.5%), watermelon (18.7%) and carrot (8.5%) in the experiment group. In the control group, there was an increase in papaya (5.5%) and sapodilla (16.6%) consumption. However there was a limited diversity of fruit and vegetable consumption in the control group when compared to the experiment group. Snacks form the core part of the school lunch box. There was a decrease in the inclusion of cakes in the experiment group (13.8%), biscuits (12.5%) and an inclusion of cashew nuts (12.5%) and pista (6.2%).

The repetitive pattern of dishes in school lunch over a duration of 5 days was studied to assess the impact of nutrition education on dietary diversification of children. The traditional family diet forms part of the child's diet from the pre-school days. There is a trend of repetition of a few standard food items often used in families across the study. There was a

Table 4: Average daily nutrient intake from lunch box

Nutrient	Control group (n=35)			Experiment group (n=35)		
	Pre-test	Post-test	Change	Pre-test	Post-test	Change
Protein (g)	3.9	2.53	-1.37	3.14	3.41	0.27
Fat (g)	3.1	4.2	1.1	3.08	2.7	-0.38
Energy (Kcal.)	150.3	154.2	3.9	131.8	130.8	-1.0
Calcium (mg)	34.7	35.9	1.2	20.1	22.8	2.7
Iron (mg)	1.6	2.2	0.6	3.4	4.8	1.4
Carotene (µg)	68.7	43.9	-24.8	68.1	78.01	9.91
Thiamine (mg)	0.092	0.18	0.08	0.50	0.800	0.30
Riboflavin (mg)	0.03	0.048	0.02	0.31	1.1	0.79
Niacin (mg)	0.57	0.50	-0.07	0.34	0.86	0.52
Vitamin C (mg)	1.46	1.29	-0.17	2.4	4.3	1.9

repetition in the consumption of dosa and processed noodles in the control group (2.5 and 2.3 times per week), however there was no repetition in the consumption of other cereal products viz. chapatti, breakfast cereal, upma and mixed rice. There was also a consumption of poori in the post-test (2 times per week) which was not subscribed to in the pre-test phase. The cereals subscribed were largely rich in fat and refined flours. The experiment group showed increase in repetition of chapati and idli (2.5 and 2 times per week). Although there was a subscription to processed noodles in the pre-test phase (2 times per week), in the post-test there was no subscription. The experiment group subscribed to more complex carbohydrate and nutritious cereal options in the post-test phase. Coconut chutney was popular accompaniment in both pre and post-test phases of both control and experiment group. There was a subscription to potato gravy and honey (2 and 3 times per week) in the experiment group, which was not subscribed to by the control group. The subscription to grapes remained the same (2 times per week) across pre and post-test phases for both the experiment and control groups.

There was a reduction in the subscription to banana in the control group (from 3 times per week to twice a week) and an increase in the experiment group (from 2 to 2.5 times a week). Apple consumption from 3 times per week from the pre-test reduced to nil in post test phase of the control group. There was a subscription to watermelon (3) papaya (2) and carrot (2) on a weekly basis in the post-test of the experiment group, which was not subscribed to in the pre-test phase. The post-test phase showed an increase in the consumption of bread with the control group (3.2 times per week) but there was no subscription to the snack by the experiment group. There was an increase in the consumption of potato chips from pre-test (3.5) to post-test (5) in the control group and a decrease from (3.2) to (2) in post-test of experiment group.

The average daily nutrient intake of children in the test and control groups changed in the post-test phase. There was decrease in protein (-1.37 grams), carotene (-24.8 µg), niacin (-0.07 mg) and Vitamin C (-0.17 mg). The post-test phase data of the experiment group showed improvement in calcium (2.7 mg), iron (1.4 mg), carotene (9.91 µg), thiamin (0.30 mg), riboflavin (0.79 mg), niacin (0.53 mg) and Vitamin C (1.9 mg). The results indicate improvement in micronutrient intake achieved by better dietary intake of the children in the experiment group. The control group showed poor dietary diversity reflected by the reduced micronutrient intake in the post-test phase (Table 4).

Discussion

The results of the study indicate that parents do have an existing knowledge base of nutrition needs for their children. However, this knowledge is not comprehensive in providing children with a balanced diet. The baseline data indicated the adequacy of only protein and riboflavin (Table 2). The data of deficient nutrients showed a sharp need for

overall improvement of nutrition in the children. The nutrient profile indicated poor consumption of energy rich foods, fruits, vegetables and dairy products. An inadequacy of nutrition quality of school meals was widely seen. A study of school children in a public school from USA showed snack profiles rich in saturated fats and sodium but lacking in all other nutrients indicating excessive consumption of unhealthy foods and processed snacks.[19]

The frequency of selecting more healthy school lunch options was seen in the post-test experiment group. Similar findings were established in a study[20], where after comprehensive nutrition education program to parents, there was an improvement in experiment group selecting healthy snacks (25.7%) and a decline in the control group (18.2%). There is a positive impact of nutrition knowledge of parents with food choices given to their children[21]. The most easily impacted food choices in children by nutrition education programs are that of fruit and vegetable consumption. Data seen from other studies[22-23] indicates improved fruit and vegetable consumption due to nutrition education of parents. The improvement in micronutrient consumption in the experiment group of the present study is indicative of better fruit and vegetable selection. It is essential to establish a preference for fruit and vegetable in pre-school children to form habitual food behaviour. As children grow older and are empowered to make school snack choices outside of home, they tend to skip on fruit and vegetables with emphasis on progressive increase in the grade in which they are studying.[24] Food related parenting practices which were encouraged in the education program of the study, have had a positive impact on the nutrient adequacy of the children's lunch boxes and also their food choices. A study from elementary schools in Belgium showed a similar impact, where behaviour modification strategies based on knowledge and proper communication showed by parents to children, showed improved food behaviour of children.[25]

Conclusion

The study showed that parents' nutrition knowledge is incomplete if they are not exposed to structured nutrition education programs. The inadequacy in total nutrients is evident and the presence of only protein and riboflavin in excess at the baseline indicates that children are still relying only on milk as a major food in their diet. The food frequency has a clear indication of preference of processed noodles in both pre and post-test. Children prefer accompaniments which are sweeter tasting than bland or spiced; jam and sugar form an integral component of children's food preference. Grapes, apples, bananas form popular fruit choices, however raw vegetables haven't yet been accepted as a regular inclusion into the lunch boxes. There is a predisposition to select foods rich in trans fats viz. cakes and biscuits. The reduction of the same in the experiment group at the post-test level indicates positive impact of the nutrition education to the parents. The overall improvement in nutrient profile indicates good dietary diversity in the experiment group, with improved micronutrient consumption. However, the group still needs to address better energy intake for growth. The control group in the post-test shows poor dietary diversity, high fat intake and has a dietary pattern which is conducive to support the onset of overweight and obesity in the children. Nutrition education to parents was found to have a positive impact on the nutrient profile of their children's school lunch boxes.

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Original Article

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Fat, Hyperlipidemia and Hypercholesterolemia in Diabetic Peripheral Neuropathy

Kumar Senthil P.*, Adhikari Prabha, Jeganathan*****

Abstract

This letter to editor was aimed at expanding the interprofessional understanding on the role of nutrition-induced hematological adaptations such as hyperlipidemia and hypercholesterolemia secondary to fat intake in diet and nutrition in diabetic peripheral neuropathy (DPN).Hypercholesterolemia induced genetic variation in tumor necrosis factor (TNF) receptor 2 gene, High-fat diet fed streptozotocin-induced diabetic rats not only developed peripheral neuropathy faster than their controls[2,3] but also associated disorders like cholesterol-induced gall bladder stones[4] and many intervention studies had shown efficacy for controlling hyperlipidemia and co-existing mechanical ad thermal allodynia in experimental models of DPN. Hyperlipidemia is thus to be regarded as a new therapeutic target for DPN.

Keywords: Food; Nutrition; Diet; Hyperlipidemia; Hypercholesterolemia; Diabetic neuropathy.

Dear Sir,

This letter to editor wishes the International Journal of Nutrition and Food Sciences on its maiden journey to scientific excellence to bridge the knowledge-practice gap in the era of scientific evidence-informed practice, education, research and administration both in health and in disease. The authors wish to highlight an example of interprofessional understanding on the role of nutrition-induced hematological adaptations such as hyperlipidemia and hypercholesterolemia secondary to fat intake in diet and nutrition in diabetic peripheral neuropathy (DPN).

Genetic influence was demonstrated by findings of Benjafield *et al*[1] who studied 357 well-characterized white patients and 183 healthy control subjects, and demonstrated genetic variation in tumor necrosis factor (TNF) receptor 2 gene (TNFRSF1B) and its association with hypercholesterolemia as shown by CA16 allele levels tracking with elevation plasma HDL cholesterol.

High-fat diet fed streptozotocin-induced diabetic rats not only developed peripheral neuropathy faster than their controls [2,3] but also associated disorders like cholesterol-induced gall bladder stones[4] and many intervention studies on menhaden oil[5] and Emblica officinalis Gaertn (Amla)[6] had shown efficacy for controlling hyperlipidemia and co-existing mechanical ad thermal allodynia in experimental models of DPN.

Vincent *et al*[7] recommended hyperlipidemia to be a new therapeutic target for DPN since it was shown by recent data that established dyslipidemia as a significant contributor to the development of diabetic neuropathy. The author explained oxidative stress mechanisms for metabolic imbalances, which mutually included hyperglycemia and hyperlipidemia, in dorsal root ganglia (DRG) of sensory neurons.

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[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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