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Impact of educational intervention on dietary practices of diabetic patients

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Abstract

Diabetic patients are increasing disproportionately in India due to rapid transition of lifestyle from traditional to westernized and urbanized culture. Educational intervention was aimed to promote better self-care and management of diabetes, giving due emphasis on key health messages for the subject population about diet, physical activities and risk factors related to type 2 diabetes and its complications. An objective of the Study was to evaluate the effectiveness of educational intervention on dietary practices of diabetic patients. A software package (CD) was developed for educational intervention. It was found that out of 15 tips given to improve the diet of diabetic patients, 12 were highly adopted by the experimental group. The number of patients who accepted these tips showed a significant increase in the post-intervention period. The mean intake of cereals, fleshy food and fats was significantly higher than the RDA in both pre- and post-periods; which was not advisable for diabetic patients. However, intakes of these foods were reduced in the post intervention period. In all other food items except pulses the mean intake was significantly lower (at 1 % level) at both pre- and post-test periods compared to RDA. But a reasonable increase in green leafy vegetables, other vegetables and fruits after intervention indicated a positive attitude in the subjects.

Key words: Educational Intervention, dietary practices, diabetic patients

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INTRODUCTION

Living with diabetes is a lifelong learning process for the individual and therefore patient education is an important and integral component of diabetic management. Epidemiologic data indicate that large numbers of patients do not receive proper care or education necessary to develop self management abilities (Asha *et al*., 2004). In the recent years it is shown that lifestyle intervention, and addressing diet and exercise reduce the risk of progressing from Impaired Glucose Tolerance (IGT) to diabetes. The importance of patient education has been acknowledged and emphasized as early as the late eighteenth century. The present article deals with the effectiveness of educational intervention on dietary practices of diabetic patients.

MATERIALS AND METHODS

The educational intervention was conducted on a sub-sample of 68 diabetic subjects, selected from Dia-Care Hospital, Kannur, based on their interest and willingness to cooperate with the study. Then the 68 subjects were divided into two groups (control and experimental) with 35 and 33 members respectively by drawing lots. A software package (CD) was developed giving due emphasis on key health messages for the subject population on dietary practices.

RESULTS AND DISCUSSION

The steps taken by the subjects to improve the adaptability to suitable diets for diabetes, based on the suggestions put across, through educational intervention are compiled and given in Table 1.

Out of 15 tips given to improve the diet of diabetic patients, 12 were highly adopted by the experimental group. The number of patients who accepted these tips showed a significant increase in the post-intervention period. Regular use of mixed cereals, vegetables, garlic and fenugreek and limited use of fried items, visible fat, sweet items and avoiding fast food and soft drinks were the recommendations that were accepted and followed to a highly appreciable extent (significant at 1% level). Though there were improvements in the use of green leafy vegetables, tea or coffee without sugar and use of milk after fat removal, the suggestions which were considered not to any significant extent.

Mean food and nutrient intake

The data on food and nutrient intake were obtained by 24-hour dietary recall from which the mean intake of

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Table 1. Dietary practices of target groups at pre- and post-intervention programme

Statement	Control (n=35)			Experimental (n=33)		
	Pre-test	Post-test	Z-test	Pre-test	Post-test	Z-test
	%	%		%	%	
Use of mixed cereals (wheat, ragi etc.)	14.3	28.6	1.479^{ns}	9.1	87.9	10.406**
Frequent small meals	25.7	17.1	0.879^{ns}	9.1	30.3	2.248*
Use of sprouted pulses	14.3	11.4	0.357^{ns}	6.1	24.2	2.129*
Avoiding fried items	17.1	25.7	0.879^{ns}	21.2	84.8	6.273**
Less intake of visible fat	48.6	48.6	0	39.4	97	6.387**
Moderate use of selected fruits (low sugar)	37.1	40	0.246^{ns}	42.4	90.9	4.872**
Use of vegetables in all meals	45.7	45.7	0	30.3	72.7	3.808**
Restricted use of meat or egg	22.9	22.9	0	33.3	63.6	2.585*
Daily use of raw salads	17.1	17.1	0	6.1	27.3	2.412*
Daily use of garlic/fenugreek	42.9	42.9	0	30.3	97	7.808**
Limited use of sweet items	37.1	37.1	0	21.2	87.9	7.321**
Regular use of green leafy vegetables	14.3	14.3	0	21.2	21.2	0
Use of milk after removing fat	40	40	0	30.3	39.4	0.778^{ns}
Tea / coffee without sugar	57.1	57.1	0	27.3	24.2	0.282^{ns}
Avoiding fast food and soft drinks.	68.6	68.6	0	54.5	93.9	4.099**

Table 2. Mean food intake of male diabetics in comparison with RDA

Food items	RDA* (g)	Pre-test		Post-test	
		Mean ± SD	t-value	Mean ± SD	t-value
Cereals	300	336.84±28.39	5.656**	305.26±61.74	0.372^{ns}
Pulses	25	15.79±21.3	1.885^{ns}	48.68±15.71	6.572**
Vegetables	200	31.05±31.91	23.078**	55.26±33.39	18.892**
Other vegetables	200	22.11±40.63	19.085**	72.89±34.13	16.234**
Fruits	200	63.68±62.91	9.445**	73.42±37.23	14.819**
Fleshy food	30	116.32±96.72	3.890**	132.11±48.8	9.120**
Milk and Milk products	200	81.58±47.76	10.809**	113.95±43.73	8.577**
Fats and oils	25	35.53±11.65	3.937**	26.32±5.23	1.097^{ns}

Ref : ICMR (2010)and Raghuram et al. (2000)* **** Significant at 0.01 levels, ns- Not significant**

food and nutrients was also calculated. The recommended dietary allowances for a diabetic patient were computed as suggested by Raghuram et al. (2000) on the basis of RDA for adults as recommended by ICMR, (2010).

The common food items which male diabetic patients consumed in large quantities were cereals, fleshy food and fats. The intake was significantly higher than RDA. The intake of cereals, fats and oils, and flesh as food items prior to intervention was not appreciable for diabetic patients. In the post-test, some reduction in the intake of these food items was observed. In all the other food items except pulses the mean intake was significantly lower (at 1 % level) at both pre and post-test periods. However, a reasonable increase in the intake of green leafy vegetables, other vegetables and fruits after intervention indicated a positive response in the subjects. Extreme inadequacy of green leafy

vegetables and other vegetables in the diet adversely affect the health due to lack of fibre. Thus, it was found that the extreme inadequacy of fibre containing food items such as green leafy vegetables and other vegetables affected the hypoglycemic condition and the micronutrient load.

Mean intake of food and nutrients

The comparison of mean food intake of females with RDA is given in Table 3.

Table 3. Mean food intake of female diabetics in comparison with RDA

Food items	RDA* (g)	Pre-test		Post-test	
		Mean ± SD	t-value	Mean ± SD	t-value
Cereals	250	290.71±39.7	3.837**	286.43±52.68	2.588*
Pulses	20	23.93±22.12	0.665^{ns}	50.00±18.29	6.136**
Leafy vegetable	200	16.79±28.39	24.144**	51.79±23.5	23.597**
Other vegetables	200	36.07±32.3	18.992**	61.79±23.01	22.479**
Fruits	100	50.71±43.23	4.266**	67.86±30.11	3.994**
Fleshy food	70	82.5±43.4	1.078^{ns}	104.29±23.11	5.551**
Milk and Milk products	150	88.21±52.97	4.364**	109.64±44.83	3.369**
Fats and oils	20	38.93±10.41	6.803**	28.57±7.45	4.305**

Ref : ICMR (2010) and Raghuram et al. (2000)*

**** Significant at 0.01 levels;**

***** Significant at 0.05 levels; ns- Not significant**

The mean food intake of the experimental groups (female diabetics) at pre- and post- intervention periods was significantly (P<0.01) lower than the RDA for the diabetics, with respect to leafy vegetables, other vegetables and milk and milk products. This may lead to health problems due to lack of fibre as well as micronutrient deficiencies. The mean intake of cereals, fleshy food and fats were significantly higher than the RDA in both pre- and post-periods; which was not advisable for diabetic patients.

However a reduced frequency of intake of food items such as beef and chicken in the post intervention period with a simultaneous increase in fish intake resulted in positive response. Intake of fish which contains omega-3 oils was advantageous for management of diabetes. Consumption of high amounts of meat and fatty foods (Hodge *et al.,* 2007) could increase the risk. High intake of processed meat products has been associated with higher diabetes risk. Fung *et al*. (2004) found that higher consumption of nuts and peanut butter was associated with a lower risk of type 2 diabetes in their large cohort study of women.

Percentage adequacy of food intake by male diabetic subjects

Table 4. Percentage adequacy of food intake by male diabetic subjects

Food items	% adequacy (Male)		
	Pre-test	Post-test	t-value
Cereals	88.82±7.57	81.40±16.47	2.91**
Pulses	21.05±28.39	64.91±20.95	6.63**
Green leafy vegetables.	31.05±31.91	55.26±33.39	2.61*
Other vegetables	11.05±20.32	36.44±17.06	5.07**
Fruits	63.68±62.91	73.42±37.23	0.67^{ns}
Flesh foods	232.63±193.44	264.21±97.60	1.09^{ns}
Milk and milk products	27.19±15.92	37.98±14.58	2.97**
Fats and oils	142.11±46.62	105.26±20.91	3.03**

Ref : ICMR (2010) and Raghuram et al. (2000)

**** significant at 0.01 levels; * significant at 0.05 levels; ns not-significant**

A gross inadequacy in case of green leafy vegetable, other vegetable, pulses and fruits has been reported among the subjects prior to intervention (Table 4). The intake was hardly sufficient to meet the RDA for other vegetables (11.05±20.32%) pulses (21.05±28.09%), milk (27.19± 15.92%) and green leafy vegetable (31.05±31.91%). But after education, the intake of such foods has increased significantly (P<0.01). However, it was less when compared to RDA. Fats and oils (142.11%) and flesh as food (232.63%) demonstrated a surplus intake, significantly above RDA.

Table 5. Percentage adequacy of food intake by female diabetic subjects

Food items	% adequacy (Female)		
	Pre-test	Post-test	t-value
Cereals	116.29±15.88	114.57±21.07	0.352^{ns}
Pulses	39.88±36.86	83.33±30.49	3.94**
Green leafy vegetables.	8.39±14.20	25.89±11.75	3.805**
Other vegetables	18.04±16.15	30.89±11.50	2.366**
Fruits	50.71±43.23	67.86±30.11	1.598^{ns}
Fleshy food	117.86±62.00	148.98±33.01	2.565*
Milk and milk products	58.81±35.32	73.10±29.89	2.133^{ns*}
Fats and oils	194.64±52.05	142.86±37.25	2.81**

Ref : ICMR (2010) and Raghuram et al. (2000)

**** Significant at 0.01 levels; * Significant at 0.05 levels; ns- Not significant**

The percentage adequacy of food requirement of female subjects also showed similar trend as that of male subjects, and also showed an increase in the intake of fat (194.64%), when compared to that of RDA at pre-intervention period. Cereals (116.29%), fats and oils (194.64%) and flesh as food (117.86%) also demonstrated a surplus of recommended values. But at the post-test stage, there was a suitable dietary modification when compared to the pre-test stage, with a significant decrease (194.64 vs. 142.86) in that intake, which was still higher than RDA. A significant (P<0.01) increase in the consumption of green leafy vegetables, other vegetables and pulses between post and pre-intervention periods was observed, which was not sufficient to meet the RDA. Fleshy food intake was significantly increased after intervention, which could be due to the increased consumption of fish by the subjects.

In a study with Finnish and Dutch cohorts of the Seven Countries on the baseline intake of total fat, saturated fat and monounsaturated fat was higher among those who were diagnosed with diabetes in the follow-up study 20 years later (Feskens *et al.,* 1995).

Mean nutrient intake of male diabetics in comparison with RDA

Table 6. Mean nutrient intake of male diabetics in comparison with RDA

Nutrient	RDA*	Pre-test		Post-test	
		Mean ± SD	t-value	Mean ± SD	t-value
Energy(kcals)	1950	1707.63±259.18	4.076**	1746.06±173.34	5.128**
Pa rotein(g)	60	57.01±22.44	0.58^{ns}	68.82±14.74	2.608*
Fat(g)	20	50.42±11.31	11.721**	43.99±7.54	13.871**
Fibre(g)	50	4.20±1.23	162.735**	7.36±1.92	96.60**
Carbohydrate(g)	290	256.48±39.52	3.697**	268.88±24.26	3.795**
Calcium(mg)	600	726.87±455.64	1.214^{ns}	971.69±352.72	4.593^{ns}
Vit. C(mg)	40	48.48±35.01	1.018^{ns}	107.99±55.94	5.298**
Iron(mg)	17	13.12±5.23	3.233**	16.68±3.83	0.359^{ns}

Ref : ICMR (2010) and Raghuram et al. (2000)

**** Significant at 0.01 levels; * Significant at 0.05 levels; ns- not significant**

At pre-test the mean energy intake of male subjects was 1707.63 kcal / day and total carbohydrate, iron and fibre consumption was 256.48g / day, 13.12mg / day and 4.20g / day respectively; which were significantly lower than RDA.

Post-test scores indicated a remarkable increase in the intake of iron and Vitamin C intake. But intake of fibre was far below the RDA in the post-intervention stage also. Fat consumption was significantly higher than RDA in both pre- and post- intervention periods. Protein intake was on par with RDA in pre-intervention period and significantly higher (P<0.01) than RDA in post-test period. This suggests the need to have a concentrated effort to control the intake of fat and fleshy food. Reduction of saturated fat intake (<7% of total energy intake) and intake of cholesterol intake (<200 mg / day) are strongly recommended for diabetic patients (ADA, 2007 and NCEP, 2002).

Mean nutrient intake of female diabetics in comparison with RDA

Table 7. Mean nutrient intake of female diabetics in comparison with RDA

Nutrient	RDA*	Pre-test		Post-test	
		Mean ± SD	t-value	Mean ± SD	t-value
Energy(kcals)	1590	1634.86±158.75	7.428**	1564.82±163.43	8.818**
Protein(g)	50	48.17±8.44	0.812^{ns}	58.49±7.56	4.200**
Fat(g)	17	54.96±12.26	11.589**	45.19±7.95	13.261**
Fiber(g)	40	4.40±1.10	120.63**	6.76±1.79	69.32**
Carbohydrate(g)	238	237.06±38.79	0.091^{ns}	231.19±31.58	0.806^{ns}
Calcium(mg)	600	473.48±200.44	2.362*	781.08±212.35	3.191**
Vit. C(mg)	40	54.71±48.80	1.128^{ns}	108.72±50.56	5.085**
Iron(mg)	21	10.03±2.21	18.524**	13.20±2.42	12.037**

Ref : ICMR (2010) and Raghuram et al. (2000)*
**** Significant at 0.01 levels; * Significant at 0.05 levels; ns- not significant**

When compared to RDA the mean iron and fibre intake of female diabetic patients were significantly lower than RDA in both pre- and post-intervention periods, whereas fat accounted to be significantly higher than the RDA in the post and pre-test periods. A study conducted by Van Dam *et al*. (2002) showed that there was modest increase in the risk of type 2 diabetes test group with a higher intake of saturated fat. For diabetic patient cholesterol intake should be minimized to 200 mg / day (ADA, 2007). An analysis (Salmeron *et al*., 2001) of the Nurses' Health Study with 14 years of follow-up showed that women in the highest quintile of vegetable fat intake had a 40 per cent lower risk of type 2 diabetes than those in the lowest quintile. An Italian study also showed that a higher consumption of oils consisting mostly of polyunsaturated fat was associated with lower fasting plasma concentrations of glucose (Trevisan *et al.,* 1990).

But some clinical and epidemiological studies have observed no effect of total fat intake on insulin sensitivity and risk of type 2 diabetes (Salmeron *et al.*, 2001). This study showed that owing to the extreme deficit of leafy vegetables and other vegetables in the diet, fibre content was far below the RDA. Mumu *et al.* (2009) also found in their study that about 9 per cent of patients did not include vegetables for a single time in their meal and dietary fibre intake was very low (4g / day). Chandelia *et al*. (2000) showed that high fibre diet reduced total triglyceride and LDL cholesterol and can help to achieve the glycemic control. Individuals at high risk for type 2 diabetes are encouraged to achieve the recommendation of dietary fibre of 14 gm fibre / 1000 Kcal (ADA, 2007).

CONCLUSION

The goal of diabetes education was to optimize blood glucose control, prevent chronic and potentially life threatening complications, and to optimize quality of life, while keeping the treatment cost effective. The findings suggest that educational intervention helped the diabetic patients with necessary knowledge and positive attitudes to bring about necessary behavioural changes in terms of diet, exercise and medication. Ultimately it resulted in greater control of blood glucose and HbA1c levels as seen among the patients in test group and there by a positive health outcome.

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