



IMPACT OF NUTRITION EDUCATION AND DIET THERAPY ON GLYCEMIC CONTROL IN PATIENTS WITH TYPE 2 DIABETES

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ABSTRACT

Lifestyle modifications including alteration of diet and physical activity are the first lines of management during diabetes. The objective of the study was to evaluate the effects of nutrition education on glycemic control in type 2 diabetics. Around 410 newly detected type 2 diabetics were selected and socio-economic, anthropometric, dietary survey and biochemical data were collected by using the standard interview schedule. Programmed nutrition education using Information Communication Technology (ICT) were conducted to all the selected subjects. Using questionnaire, pre and post test was conducted to find the knowledge improvement on diabetes management. The mean scores 9.90 ± 1.60 obtained in pre-test were increased to 17.85 ± 1.15 after nutrition education. For the selected subjects without hypoglycemic drugs, fasting blood glucose reduced by 27.92 mg/dl ($t = 8.612$), post prandial blood glucose reduced by 53.94 mg/dl ($t = 14.442$) and HbA1c reduced by 0.55% ($t = 13.987$). Thus, imparting nutrition education through ICT tools was found to be effective in improving the level of nutrition knowledge.

KEYWORDS : Diabetes, Nutrition Education, Knowledge

INTRODUCTION

Prevalence of type 2 diabetes mellitus is increasing globally and has reached epidemic proportions in many countries. The estimates by the International Diabetes Federation (IDF) showed that the number of adults affected by the disease in 2011 was 366 million which was projected to increase to 552 million by 2030. Nearly 80% of the affected people live in middle- and low-income countries especially like India (Unwin *et al.*, 2011).

Steinsbekk *et al.*, (2012) reported that Diabetes Self-Management Education and Support (DSME) reduce the onset and/or advancement of diabetes complications, to improve quality of life and lifestyle behaviours such as healthful eating pattern and engaging in regular physical activity and to decrease the presence of diabetes-related distress and depression. In addition, better outcomes have been shown to be associated with the amount of time spent with a diabetes educator. So the present study designed with objectives to measure the anthropometric status, know the dietary habits, investigate the glycemic control and the impact of nutrition education of the selected subjects

METHODOLOGY

The study was conducted in Coimbatore city, by purposive sampling method, the investigator enlisted from June 2012 – May 2013 around 410 newly detected type 2 diabetics, who visited the Diabetes specialties centres in Coimbatore for general check-up were selected for the study on the inclusion criteria- newly detected type 2 diabetes FBS: $>100 \text{ mg/dl}$, HbA1c $>5.6\%$, Oral Glucose Tolerance Test (OGTT): FBS: $>126 \text{ mg/dl}$, 2hr $>200 \text{ mg/dl}$ and exclusion criteria- Osteoporosis, Complicated cases of diabetes mellitus, known cases of type 2 diabetes on treatment.

The data collection was carried out through a structured questionnaire which included the information regarding their age, sex, marital status, family history of diabetes, symptoms onset on diabetes, known medical illness, anthropometric measurements, physical activity, clinical parameters and nutritional status was assessed by 24 hour diet recall and food frequency questionnaire. Under the anthropometric measurement, body weight, height, waist and hip circumferences were measured. Body Mass Index (BMI) was computed as the ratio of weight (kg) per height squared (m^2). Waist circumference, hip circumference was measured and waist –to –hip ratio was calculated from these circumferences.

The biochemical investigations carried out were OGTT (Oral Glucose Tolerance Test), fasting and post prandial blood glucose and HbA1c (Glycosylated Haemoglobin). Awareness and education on Diabetes management was provided to all the selected 410 subjects by using Power Point presentations, videos, individual counseling and guidelines to all the selected subjects to prevent complications. Questionnaire with 20 questions was framed by the investigator to assess the effect of the diabetes education. Pre-test and post test was conducted for the each awareness sessions and the investigator scored

it to find the knowledge improvement about diabetes management. After three to four months the glycemic control was analysed to know the impact of diet therapy and diabetes education to the selected subjects.

RESULTS AND DISCUSSION

1. Background information of selected samples

Many factors contribute to the onset of diabetes and these are termed as predisposing or risk factors. Environmental factors such as diet, obesity and sedentary life style increase the risk of diabetes (Zimmet *et al.* 2001).

a. Age-wise distribution and gender

Among the selected newly detected diabetic cases 52% (214) were female subjects and 48% (196) were male subjects. It was found that most of the female subjects age group was between 30 years to 35 years and most of the male subjects age group was 35 years to 40 years. Nearly 7% of the selected females and 5% of the selected males belonged to 25-30 years of age.

b. Symptoms at onset of diabetes

From the selected 214 female newly detected diabetics 85 subjects recorded the symptoms of weight loss, polydipsia (27%), tiredness (18%), giddiness (6%) and 28 females had urinary tract infection. Among the male cases 34% logged as weight loss, tiredness (11%). Around 29 females and 49 males were diagnosed as diabetes by undergoing general check-up.

c. Other medical illness

Among the selected subjects 14 females and 19 males informed that they already have hypertension and they were on drugs, seven females and 16 males had hypertriglyceridemia, only four females had hypothyroidism and were on treatment.

d. Physical Activity

The Indian Diabetes Prevention Programme (IDPP), a preventive study done in India based on the Diabetes Prevention Program (DPP) has clearly documented the importance of physical activity in the prevention of diabetes. It was awful to know that 69% of females and 58% of males were not involved in any type of physical activities. Only 7% of females and 7% of males spent regular time for normal walking, 24 females and 27 males were engaged in physical activities for 3 to 4 days a week.

2. Anthropometric status of selected subjects

There is a strong association between excess weight and risk of incident diabetes and showed that body mass index (BMI), WC and WHR had a similar association with incident diabetes. Hadaegh *et al* (2009) state in a study that over a median follow up of 3.5 years (11 months-6.3 years), 114 individuals developed diabetes (4.1%). The risk for developing diabetes was significantly higher for the highest quartile of Body Mass Index (BMI), Waist Circumference (WC), Waist Hip Ratio (WHR) respectively, compared to the lowest quartile, and the risk decreased but remained statistically significant when abnormal

glucose tolerance was included in the multivariate model.

Table-1 Anthropometric Status of all the Selected Subjects as Indicated by BMI

S.No	BMI status	WHO* Criteria	Number of subjects(n=410)			
			Females(n=214)		Males(n=196)	
			Numbers	%	Numbers	%
1.	Underweight	< 18.5	-	-	-	-
2.	Normal	18.5-24.9	96	45	48	24
3.	Over weight	25-29.9	103	48	118	60
4.	Obesity grade I	30-34.9	09	04	19	10
5.	Obesity grade II	35-39.9	06	03	11	06
6.	Obesity grade III	>40	-	-	-	-
7.	Total		214	100	196	100

* World Health Organisation

It was clear that among the selected subjects 48% of the female and 60 % of the male subjects were overweight, whereas only 45% of females and 24% of the males stood with normal BMI. Grade-I obesity were 4% females and 10% male subjects and grade-II obesity 3% females and 6% males. None of the selected subjects were underweight or grade-III obese

3. Nutritional Status

The intake of energy, carbohydrate and fat consumption by female subjects were in excess to the RDI by 147kcal, 21.2g and 9.17g respectively. Protein and fibre were deficit by 10.86g and 6.13g respectively. Among the selected male subjects the energy, carbohydrate and fat consumption were excess than the RDI by 120kcal, 23.1g and 5.62g respectively. Protein and fibre were deficit by 8.71g and 5.08g respectively.

Diet survey of the subjects indicated high intake of fats, carbohydrates and energy and inadequate intake of proteins, fibre and iron as compared to their recommended values.

4. Impact of Nutrition Education

Community based care including nutrition education and physical exercise intervention, could be a feasible model for control of diabetes and its risk factors. In Saudi Arabia and Britannia, the positive effects of nutrition education on knowledge, attitude and practice of diabetic patients has been shown (Uddin *et al.*, 2001). Knowledge score obtained by the subjects before and after imparting nutrition education was given in table below

Table-2 Impact of Nutrition Education

Scores	Pre-test (T1)		Post-test (T2)	
	No of Subjects	%	No of Subjects	%
Poor (5-10)	116	54	-	-
Average (10-15)	98	46	60	28
Good (15-20)	-	-	154	72

After imparting nutrition education, the picture of score board gets changed, as none of the respondent had score between 5-10 marks while most of the respondents (72%) scored between 15-20 marks. The Knowledge scores obtained by the selected subjects were inferred in the below figure.

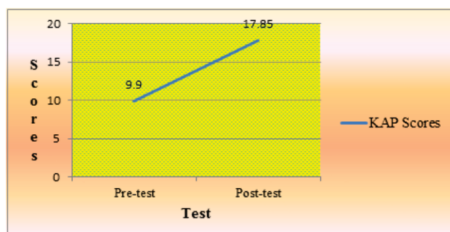


Fig.01: Knowledge Scores obtained by the Subjects

The statistical analysis of the data from the above table further revealed the effectiveness of the nutrition education among the respondents, which was measured in terms of gain in scores. The mean scores 9.90±1.60 obtained in pre-test were increased to 17.85 ±1.15 after giving nutrition education. The gain in knowledge of nutrition education score was 7.95. Thus, imparting nutrition education was found to be effective in improving the level of nutrition knowledge.

5. Impact of nutrition education on glycaemic control

Askari *et al.*, (2013) in their study observed that the mean weight, FBG, PPBG, cholesterol and triglyceride after intervention were lower than before that (p<0.05). Adherence to nutritional programs and awareness of healthy food choices can lead to considerable decrease in diabetes complications and may also lead to saving economic resources. After diabetes education the glycaemic status of the selected subjects were given in table-3

Table-3 Glycaemic status of the selected subjects after diabetes education (n=11)

Glycaemic parameters	On recruitment	After four months	Difference Between recruitment and fourth month	“t” value
FBG mg/dl	142.65± 13.44	114.73 ± 5.55	-27.92	8.612*
PPBG mg/dl	224.12± 16.46	171.18 ±9.84	-53.94	14.442*
HbA1c %	7.95 ± 0.28	7.4 ± 0.26	-0.55	13.987*

*Significant; p≤0.05

From the table it was clear that for the selected diabetic subjects, FBG reduced by 27.92mg/dl (t= 8.612), PPBG reduced by 53.94mg/dl (t= 14.442) and HbA1c also reduced by 0.55% (t= 13.987). It was concluded that nutrition education has a great role in the treatment of T2DM.

CONCLUSION

Glycaemic control in the newly detected diabetics could be brought about through nutrition education focusing on food choices and quantity of intake along with physical activity. Those who are not able to comply by changes in these two areas of lifestyle require Oral Hypoglycemic Agents.

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