

DIABETES EDUCATION: ITS EFFECTS ON GLYCEMIC CONTROL

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Diabetes is a chronic disease which requires permanent treatment, and has repercussions on the patient's daily activities, tempo of life, dietary habits and physical exercise. This treatment also carries a risk of acute metabolic complications, which causes fear on the part of the patient. The constraints and fears have important effects on the patient's state of mind, and must be taken into consideration by all those who look after him. For a strict and global handling of the diabetic's medical problems, it has been found necessary to institute an integrated approach aimed at informing the patient, teaching him practical actions, facilitating his autonomy and reducing his anxiety and isolation. This approach is called diabetes education. In other words, we can say that diabetes education is a combination of activities aimed at facilitating change in behavior and adoption of practices that could decrease the risk of disease and illness, and thus reduce the incidence of death and disability.¹

Education is undoubtedly essential for the achievement of the high standards of self-management on which good diabetic control depends. It is self-evident that diabetics who know little or nothing about their disease are unlikely to maintain good day-to-day control. This was acknowledged in the 1920s with the development of the Joslin Clinic in the US,² and in the doctrine of R.D. Lawrence in the U.K.³ The pivotal role of education and the vital need for its further development have been emphasized by numerous studies in the last 15 years.⁴⁻⁹ These have demonstrated that educational measures such as formal instruction programs, 24-hour telephonic advisory services, and the introduction of a nurse as a diabetes educator, significantly improved various endpoints, including glycemic control.

The importance of diabetes education is well appraised all over the world. Efforts are being made to minimize complications of diabetes by increasing knowledge leading to positive behavior to combat the disease's ill effects on quality of life.^{10,11}

consecutive patients were enrolled in the study over a one-year period. Patients with mental retardation and gestational diabetes were excluded.

A questionnaire prepared beforehand was used as an instrument of assessment before and after the diabetes health education program was delivered to the patients. Data collected was analyzed by a statistical package (Epidemiological Information System, version 6). Three statistical tests (chi-square test, *t*-test and *f*-test) were used to assist in analyzing the association among several variables and to make statistical decisions.

The educational program comprised 5 units in 12 sessions covering all the major aspects of diabetes mellitus required by any patient. Two nurses were trained as diabetes health educators. All the materials used for educating the diabetic patients, including pamphlets/handouts were made available in the national language, i.e., Arabic, and were given to all patients. Videotapes were shown in the hospital waiting area, and arrangements were made to lend the audio and videocassettes to the patients. In addition, specific educational programs which the patients received through the diabetes educators and one-on-one counseling sessions, were also arranged with the doctor.

Results

The target group comprised 116 males (38.7%) and 184 females (61.3%). Forty-eight males out of 116 and 117 females out of 184 were above the age of 50 years. The mean age of the group was 45.78, and 91 patients (30.33%) belonged to the age group of 40-49 years.

The number of patients with type I diabetes mellitus (DM) was 116 (38.7%), comprising 84 females (72%) and 32 males (27%). Type II DM patients totalled 184 patients (61.3%), comprising 100 females (54.3%) and 84 males (45.6%). About 46.3% of patients were maintained on diet and oral medication, 35.3% on insulin injection, while those managed only on diet were 8.3%.

Table 1 shows that before attending the diabetes

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Patients and Methods

The target group of the study was Saudi nationals between 12 and 75 years of age of either sex who were registered with the Diabetic Clinic of King Saud Hospital, Unaizah, Al-Qassim, in Saudi Arabia. A total of 300

TABLE 1. Fasting blood glucose level before and after education.

Fasting blood glucose*	No. of patients (n=300)	
	Before education	After education
<6.7	18	136
6.7-13	225	124
>13	57	10
Mean fasting blood glucose**	10.7 mmolL	7.3 mmolL

*SD=0.639; standard error=0.037; $P<0.005$; **SD=0.061; SE=0.004; $P<0.005$.

TABLE 2. Relationship of control of diabetes with sex.

Degree of control

Sex	Total	Before education		After education	
		<6.7	>6.7	<6.7	>6.7
Male	116	2	114	58	58
Female	184	16	168	108	76

TABLE 3. Relationship of control of diabetes with educational status.

Educational level	Total	Degree of control			
		Before education		After education	
		<6.7	>6.7	<6.7	>6.7
Unable to read and write	74	8	66	42	32
Able to read/write (no formal education)	31	2	29	19	12
Primary (5 years) education	29	2	27	12	17
Secondary (10 years) education	46	2	44	28	18
Intermediate (12 years) education	71	2	69	34	37
University graduation	40	2	38	28	12
Postgraduate	9	0	9	5	4

SD=2.140; SE=0.169.

education program, mean fasting blood glucose was 10.7 mmol, and 18 patients were under the normal level of 6.7 mmol. Conditions changed after education, and mean value fell up to 7.3 mmol. The total number of patients in whom mean blood sugar level fell below 6.7 mmol was 136, and only 7 patients had over 13 mmol of blood sugar level. When *t*-test was applied, it showed a difference between the mean of fasting blood sugar before and after education (P -value <0.01), and confirmed that the level of blood glucose was affected by education.

Tables 2 and 3 show the relationship of control of diabetes with educational status and sex. Those who were unable to read and write numbered 76, while 29 patients did not receive formal education but were able to read and write. These patients represented 35% of the target group. Females dominated this group and most were above the age of 50 years. Only 49 patients were graduates and post-graduate degree holders.

Chi-square test was used to analyze the relationship between control of diabetes with education and sex. The chi-square for males was 70.5, with a P -value of <0.005, while it was 102.95 with a P -value of <0.005 for females. This shows that both sexes are receptive to diabetic education. We observed that the chi-square for females was higher than for males. Chi-square for both sexes, combined

before and after education, showed significant improvement in educational level (P <0.005). *F*-test also concluded that there was a difference between the results before and after education, P -value being less than 0.01, and that patients of any educational level were equally receptive to educational advice.

Discussion

Health education intervention is a combination of activities aimed at facilitating change in behavior and adoption of practices that could decrease the risk of disease

and illness, and thus reduce the incidence of death and disability.¹² The modern treatment of patients with diabetes involves an organized package of care that includes education, self-monitoring of blood glucose levels, and screening for an early treatment of complications. The vital point of therapy is to attempt to maintain the blood glucose level as close to normal as possible, while avoiding frequent and disabling hypoglycemia.¹³

The high mean fasting blood glucose level of 10.695 may reflect suboptimal diabetes care, lack of patient information and motivation, the severity of disease and underdosage of insulin and drugs (for fear of hypoglycemia). The knowledge status about diabetes before getting the educational program confirmed the existence of knowledge gaps and inadequacies in compliance and self-management affecting overall diabetes care. The mean value of blood sugar levels fell to 7.3 mmol after attending the diabetes education program and thus testified that the knowledge had filled the gap, and that compliance and self-management had improved.

The education status of the target group was included in the demographic data to check whether there was any correlation between high educational status and good control, and whether the illiterate and the less educated class could understand the message conveyed through different modalities of health education. Those with little or no education represented 35% of the groups and 85% were females. They all proved very receptive to the educational message conveyed to them. It is quite evident that patients are receptive, irrespective of their educational background. The glycemetic control had no relation with the educational status. There were only 18 patients who were <6.7 mmol before getting health education, and this number increased to 166 after education. The marked drop of blood sugar was quite obvious in all educational groups after getting diabetes education.

The objective of any educational program is to bring about a desired change in behavior or practice.¹⁴ The first step to achieving this target is to improve knowledge. The knowledge imparted during the program showed its effects. It is of utmost importance that diabetes education be incorporated in all diabetes care plans, and also into public information services in order to increase public awareness regarding this disease.

References

1. Geaber AL, Chirtman BG, Alogra MT, Davidson JK. Evaluation of diabetes patient education programme. *Diabetes* 1977;26:61-4.
2. Joslin EP, Gray H, Root HF. Insulin in hospital and home. *J Metab Res* 1922;2:651-99.
3. Lawrence RD. *The diabetic life*. London: J&A Churchill, 1925.
4. Miller LV, Goldsten J, Nicolaisen G. Evaluation of patients' knowledge of diabetes self care. *Diabetes Care* 1978;1:275-80.
5. Runyan JW. The Memphis Chronic Disease Program. *J Am Med Assoc* 1975;231:264-7.
6. Nersesian W, Zaremba M. Impact of diabetes outpatient education programme. *Morb Mortal Wkly Rep* 1982;31:307-414.

7. Geller J, Butler K. Study of educational deficits as the cause of hospital admissions for diabetes mellitus in a community hospital. *Diabetes Care* 1981;4:487-9.
8. Scott RS, Brown LJ, Clifford P. Use of health services by diabetic persons. II: hospital admissions. *Diabetes Care* 1985;8:43-7.
9. Assal J-P, Gfeller R, Ekoe JM. Patient education in diabetes. In: *Recent trends in diabetic research*. Stockholm: Almquist & Wikell International, 1982:276-89.
10. Busfield R, Walker R, Day JL. Good diabetic control: the role of patients' perception and beliefs. *Diabetologica* 1986;29:523A.
11. Sjoberg S, Carlson A, Rosenquist U, Othman J. Health attitudes, self-monitoring of blood glucose, metabolic control and residual insulin section in type I diabetic patients. *Diabet Med* 1988;5:449-53.
12. Gordon SJ. A case study of health education intervention in Burkina Faso: from reality to theory (thesis). Pittsburgh: University of Pittsburgh, 1992:176.
13. Mackinnon M. Education for self management: providing diabetes care in general practice. London: Class Publishing, 1993:145.
14. Mager RF. *Preparing instructional objectives*. California: Fearon, 1951.