Initial responses to treatment of newly-diagnosed Saudi non-insulin dependent diabetic patients

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Abstract

The present study was carried out on a group of 105 non-insulin dependent diabetic patients attending the diabetic clinic at King Khalid University Hospital, Riyadh, Saudi Arabia. The aim of the study was to determine the effects of dietary counselling on serum lipid levels and parameters of glycaemic control.

The study revealed that some patients dropped out from the second visit for evaluation. The defaulting patients were found to be mainly illiterate females. All the patients followed up developed lower levels of fasting blood glucose and glycosylated haemoglobin, irrespective of form of treatment. However, serum cholesterol was reduced by diet plus oral hypoglycaemic agents, and serum triglycerides were not affected by either treatment modalities.

The control of diabetes should include, in addition to glycaemic control, detection of lipid abnormalities and their response to treatment.

During the last 15–20 years, the prevalence of diabetes has been on the rise in Saudi Arabia, where it can now be regarded as a major health problem in Saudi society. The increase in prevalence is regarded as an outcome of the urbanisation and modernisation of the country, with an increase in sedentary life and the richness and abundance of foods[1].

Older adults are more susceptible to non-insulin dependent diabetes mellitus (NIDDM) and have the highest morbidity and mortality from atherosclerotic complications. The goals of treatment in NIDDM are to achieve good control of blood glucose levels, achieve weight loss in the overweight and obese, and achieve and maintain normal serum lipids[2].

Diet is a cornerstone of treatment in diabetes, and a healthy diet should be promoted to develop and maintain good, healthy eating habits throughout life. Early recommendations called for diabetic diets low in total carbohydrates, with the result that the proportion of energy from fat was relatively high. The American Diabetes Association[3] now recommends that carbohydrate intake be liberalised to 55–60% of energy intake, fat intake lowered to 30% or less of the total energy intake, daily fibre intake increased to 40g, and salt intake reduced. Most of the carbohydrates should be in the form of polysaccharides (e.g. legumes, cereal, bread).

Diabetic patients seek medical advice with the aim of curing the disease. They take the trouble of undergoing sometimes uncomfortable tests, diagnostic procedures, various dietary regimens and taking medications only to discontinue follow-up visits. This study was carried out in an attempt to evaluate the effectiveness of dietary counselling on serum lipids and parameters of glycaemic control.

Materials and methods

One hundred and five patients, newly diagnosed as having NIDDM and attending King Khalid University Hospital (KKUH), were included in the study. KKUH serves as a teaching base for King Saud University and is one of the largest tertiary hospitals in the kingdom of Saudi Arabia. Within the Department of Nutrition, both in- and outpatient services are provided for the diabetics by a trained dietician. Services are organised for all newly-diagnosed patients and other follow-up cases in collaboration with physicians.

Patients for the study were selected consecutively as they came for consultation. Data was collected using a structured interview guide, including the review of patients' notes. Each interview took approximately 40 minutes. Information collected included demographic information, knowledge about diabetes, consciousness of the importance of treating diabetes, dietary history and management. The questionnaire was pilot tested on 12 clinic patients, after which it was clarified and corrected on the basis of results received.

During the interview, each patient was prescribed a controlled diabetic diet using local food exchange lists. The total calorie intake was determined by the dietician, taking into consideration the patient's age, weight, lifestyle and occupation. The calorie intake was translated into food exchanges, and patients were asked to comply with the food exchange system every day. They were taught to choose their daily meals from the exchange lists and given diet sheets showing foods from the exchange lists. Twenty-five patients were put on to oral hypoglycaemic agents (OHAs) at the first visit. When OHAs were used, patients were instructed that the effectiveness of the drugs depended on continued

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compliance with diet modification. Patients were given an appointment by the dietician for subsequent attendance at the outpatient clinic after eight weeks.

Blood was taken for biochemical analysis including glucose (estimated by the American Monitor Autoanalyzer), cholesterol, triglycerides, and glycosylated haemoglobin (HbA_{1c}) was measured using Glyco-Hb Quick Column (Helena Laboratories).

Upon return of the patient for the second visit, the structured interview was repeated and blood was taken for biochemical analysis. The results of the interview were compared with those of the previous visit. Forty-three patients (18 on diet and 25 on OHA) came for the subsequent visit and sixty-two patients broke their appointments. Standard statistical methods including descriptive data and t-tests were applied as appropriate.

Results

Table 1 shows general demographic characteristics of 'follow-up' and 'drop-out' patients. The major difference occur in the area of education, follow-up patients being more literate.

Table 2 shows the patients' response to selected attitude statements. Most of the follow-up patients (74.4%) agreed that diet is very important in the control of diabetes, compared with 11.3% of the drop-out patients. Seventy percent of the follow-up and 60% of the drop-out patients trusted their physician or dietician.

While the majority of subjects showed improved metabolic control (Table 3), it was most marked in the 'diet plus OHA' groups. Thus, fasting blood sugar glucose (FBG) and HbA_{1c} dropped significantly in both groups at the end of the study period. However, serum triglycerides and cholesterol in the diet group were not affected.

Discussion

Diet remains the cornerstone in the management of diabetes mellitus. It is accompanied when necessary by an oral hypoglycaemic agent or insulin[4]. Initially, there were 105 subjects, but 62 dropped out from the second visit. Therefore, 43 follow-up subjects were non-defaulters. The majority of the dropped-out subjects were illiterate females with misconceptions about diabetes, such as the role of diet in the control of diabetes. Studies have shown that the following reasons were responsible for a large percentage of drop-out (broken appointments): patients waiting for more than 60 minutes, education less than seven

Table 1: *Demographic characteristics of 'follow-up' and 'drop-out' Saudi diabetic patients.*

Characteristics	Follow-up (n=43)		Drop-out (n=62)	
	Male (n=22)	Female (n=21)	Male (n=25)	Female (n=37)
	No. (%)	No. (%)	No. (%)	No. (%)
Age (years):				
<40	0 (0)	0 (0)	1 (4.0)	0 (0)
40–55	18 (81.8)	18 (85.7)	18 (72.0)	34 (91.9)
>55	4 (18.2)	3 (14.3)	6 (24.0)	3 (8.1)
Education:				
Illiterate	2 (9.1)	8 (38.1)	9 (36.0)	22 (59.5)
Literate	20 (90.9)	13 (61.9)	16 (64.0)	15 (40.5)

Table 2: *Agreement of Saudi diabetics to selected statements.*

Statements	No.	%
1. Diet is very important for diabetes control		
Follow-up (n=43)	32	74.4
Drop-out (n=62)	7	11.3
2. Carbohydrates should be restricted in diabetes		
Follow-up (n=43)	9	20.9
Drop-out (n=62)	12	19.4
3. I trust my physician or dietician		
Follow-up (n=43)	30	69.8
Drop-out (n=62)	37	59.7
4. Changing my food habits will take most of my time		
Follow-up (n=43)	10	23.0
Drop-out (n=62)	25	40.0
5. I regularly use herbal medicine		
Follow-up (n=43)	13	30.2
Drop-out (n=62)	17	27.4

Table 3: *Effect of treatment on biochemical parameters.*

	First visit Mean (±SD)	Second visit Mean (±SD)	p value
1. Fasting blood glucose (mmol/l)			
Diet alone	10.5 (±3.8)	8.3 (±3.2)	0.05
Diet + oral hypoglycaemic agent (OHA)	13.0 (±4.7)	8.0 (±2.3)	0.001
2. Cholesterol (mmol/l)			
Diet alone	5.0 (±1.6)	4.5 (±1.4)	0.29
OHA + diet	5.9 (±1.0)	5.0 (±1.2)	0.008
3. Triglycerides (mmol/l)			
Diet alone	2.2 (±1.6)	1.8 (±0.6)	0.35
OHA + diet	2.8 (±2.6)	2.1 (±1.1)	0.22
4. Glycosylated haemoglobin (HbA_{1c}%)			
Diet alone	9.9 (±1.9)	8.1 (±1.4)	0.003
OHA + diet	11.5 (±3.4)	8.3 (±1.3)	0.005

years, perception of no improvement, perception of no seriousness, and lack of knowledge of the medical problem[5–7]. For the drop-out (defaulters) group there is a need for special health programmes or perhaps follow-up by telephone to remind them of their appointment.

Our study is in agreement with El-Hazmi *et al*[8] who reported that in Saudi diabetic patients, metabolic abnormalities were the frequent elevation of glucose, HbA_{1c} serum, triglyceride and cholesterol. Hypertriglyceridaemia is common in diabetes, due to increased production and reduced clearance of triglycerides, in association with lipoprotein deficiency. Some 15% to 40% of all diabetic patients exhibit hypertriglyceridaemia[9].

In the present study, triglycerides failed to show significant variation in both the diet-alone and diet-plus-OHA treatment groups. In our study, the weak variation in triglycerides may be carbohydrate induced. Ulman *et al*[10] reported that a sudden increase in dietary carbohydrate increases plasma triglyceride level. However, patients gradually introduced to a high-carbohydrate and low-fat diet may achieve a significant reduction in plasma total and LDL cholesterol without developing carbohydrate-induced hypertriglyceredaemia.

The present study demonstrated a significant effect of both diet and diet plus OHA on fasting blood glucose. However, serum cholesterol was reduced in the diet-plus-OHA group only. Abassy *et al*[11] reported that all patients had a lower level of serum cholesterol after control, irrespective of the form of treatment.

In the present work, we tried to study some aspects of carbohydrate and lipid metabolism when diabetes is brought under control by oral hypoglycaemic agents and diet. We conclude that control of diabetes should include, in addition to glycaemic control, the detection of lipid abnormalities and a monitoring of their response to treatment.

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Original Article

Red cell sorbitol estimation in the assessment of diabetic control

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Abstract

Red cell sorbitol was measured in 200 apparently healthy Nigerians, 181 known Nigerian diabetics, and 18 newly-diagnosed diabetics following treatment for 16 weeks. A reference interval of 4.1–14.8nmol/gHb for red cell sorbitol was obtained. A clinical decision limit of red cell sorbitol of 17.0nmol/gHb based on mean +3SD or greater was suggested.

The mean value of red cell sorbitol was significantly higher ($p<0.001$) in diabetics (Types 1 and 2) than in the healthy controls. The mean values of plasma glucose and fructosamine in the diabetics were significantly higher ($p<0.001$) than in controls, as expected. Red cell sorbitol correlated positively and significantly with plasma glucose ($r=0.745$; $p<0.001$) in a mixed diabetic population (Types 1 and 2). Similarly the correlation between plasma fructosamine and red cell sorbitol in the diabetics (Types 1 and 2) was significant ($r=0.478$; $p<0.001$).

Applying the red cell sorbitol assay to the assessment of metabolic control in diabetic Nigerians using the suggested criteria, 54.0% of the diabetic patients were in a state of poor control, 14.7% moderate control, and 31.3% good control.

Serial study of red cell sorbitol in 18 newly-diagnosed diabetics following therapy showed that the mean red cell sorbitol concentration at presentation was significantly higher ($p<0.001$) than at eight and 16 weeks. Similar observations were made for plasma glucose and serum fructosamine.

These observations further support the application of red cell sorbitol as a good index of monitoring metabolic control in diabetic patients.