Self-Care, Compliance and Glycaemic Control in Jamaican Adults with Diabetes Mellitus

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ABSTRACT

Appropriate self-care practices, including nutrition and medication compliance, are essential to satisfactory control of diabetes mellitus (DM). This descriptive study assesses self-care practices, and their relationships to glycaemic control in adults with DM in Jamaica. A pre-tested structured interview and anthropometric measurements were carried out on 98 women and 35 men, randomly selected from a population (n = 510) of adult clinic patients. HbA_{1c} was used as the index of glycaemic control. Self-care practice scores indicated the extent of compliance with appropriate lifestyle practices. Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Men (median age, 62 years) were significantly older (z = -2.64, p = *0.008) than the women (55 years). The median duration of DM was: men, seven years; women: 10.5 years. Sixty-nine per cent were being treated with insulin. Only 45% reported full compliance with medications. Their median body mass index (BMI) was 29.1, (16.6 – 47.4) kg/m^2. Eighty-one per cent were overweight or obese. Forty-six per cent described diet and/or obesity as contributing to their diabetes. Eighty-five per cent had consulted a dietitian but only 56.4% reported being on a "special diet". Only 16.5% reported not taking any sugar. Self-care scores were inversely related to HbA_{1c}% (*p = *0.008), BMI (*p = *0.001), sugar intake (*p = *0.005) and were lowest in the area of weight control and exercise. Only 23% had blood glucose controlled to HbA_{1c} # 6.5%. In women, HbA_{1c}% levels were inversely related to compliance with medication (*p = *0.004). Glycaemic control in adults with diabetes mellitus is related to their self-care practices, especially weight control, exercise and medication compliance.*

Autocuidado, Cumplimiento y Control Glicémico en los Adultos Jamaicanos con Diabetes Mellitus

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RESUMEN

Las prácticas apropiadas de autocuidado, incluyendo cumplir con los requerimientos de la nutrición y la medicación, son esenciales para el control satisfactorio de la diabetes mellitus (DM). Este estudio descriptivo evalúa las prácticas de autocuidado, y sus relaciones con el control glicémico en adultos con DM en Jamaica. Una entrevista estructurada, previamente probada, así como mediciones antropométricas, fueron llevadas a cabo en 98 mujeres y 35 hombres, seleccionados aleatoriamente de una población (n = 510) de pacientes de una clínica de adultos. La prueba HbA_{1c} se usó como índice de control glicémico. Las puntuaciones de la práctica de autocontrol indicaron el grado de conformidad con prácticas de estilo de vida apropiadas. Los datos fueron analizados utilizando el denominado Paquete Estadístico para la Ciencias Sociales (SPSS). Los hombres (edad mediana, 62 años) eran significativamente mayores (z = -2.64, p = *0.008) que las mujeres (55 años). La duración mediana de la DM fue como sigue: los hombres, siete años; las mujeres 10.5 años. El sesenta y nueve por ciento fue tratado con insulina. Sólo el 45% reportó cumplimiento total con los medicamentos. El índice de la masa mediana de su cuerpo (BMI) fue 29.1 (16.6–47.4) kg/m. El ochenta y uno por ciento resultaró estar por encima del peso o ser obesos. El cuarenta y seis por ciento describió la dieta y/o la obesidad como factores que contribuían a su diabetes. El ochenta y cinco por ciento había consultado a un dietista, pero sólo el 56.4% reportó estar haciendo una "dieta especial". Sólo el 16.5% reportó*

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*no estar ingiriendo azúcar ninguna. Las puntuaciones de autocuidados se hallaron en proporción inversa al por ciento resultante de la prueba HbA_{1c}% (*p = *0.008), BMI (*p = *0.001), ingestión de azúcar (*p = *0.005) y fueron los más bajos en el área de control de peso y ejercicios. Sólo el 23% tenía la glucosa en sangre controlada en correspondencia con HbA_{1c} # 6.5%. En las mujeres, los niveles de HbA_{1c}% estuvieron en proporción inversa al cumplimiento de la medicación (*p = *0.004). El control glicémico en los adultos con diabetes mellitus está relacionado con sus prácticas de autocuidado, especialmente el control de su peso, los ejercicios y el cumplimiento de la medicación.*

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INTRODUCTION

In the Americas, it is estimated that 34 million persons have diabetes mellitus (DM) (1). The Caribbean has demonstrated an increasing prevalence of Type 2 diabetes mellitus associated with obesity due to the recent transition to a high consumption of energy dense foods and increasing inactivity (2). In Jamaca, the adjusted prevalence rates (95% CI) are 9.5% (7.0–12.0) for men and 15.7% (13.2–18.3) for women in a population of 2.6 million (3). Control is reported to be inadequate (4) despite the provision of regular monitoring, surveillance and improved access to pharmaceuticals (5).

In Trinidad, the majority (85%) of patients with Type 2 diabetes mellitus attending primary care clinics also had poor glycaemic control. They had generalized obesity, upper body obesity, hypertension and increased risk of heart disease (6). A study in eight European countries showed that 31% of individuals were controlled (7).

Pilot studies in Jamaica, showed satisfactory glycaemic control in only 21–28% of patients with DM. Eighty-three per cent were overweight or obese and paid little attention to diet and exercise. They reported taking unrestricted sugar in food and beverages and their sugar intake correlated with poor glycaemic control (8–10). Education, controlled diet and physical exercise are important factors in achieving metabolic control and avoiding long term complications (11). This study assesses self-care practices including nutrition and medication compliance, and their relationship to glycaemic control in adults with DM in Jamaica.

PATIENTS AND METHODS

A random sample (n = 133) of 35 men and 98 women with DM were selected from a population of 510 patients (144 men, 366 women) attending Diabetes Specialist Clinic of the University Hospital of the West Indies in Jamaica. The sample size, using the mean and standard deviation of HbA_{1c} (6) was determined according to Cochran (12). The study was approved by the University of the West Indies Faculty of Medical Sciences Ethics Committee. Informed consent was obtained from each participant. Confidentiality of all information was maintained. Individuals who were pregnant, unable to answer questions and/or were unable to stand for measurements were excluded.

In 2003, an in-depth interview of each participant was conducted by one of three nurse researchers, who had had no previous contact with the participants. The pre-tested structured interview schedule was informed by two pilot studies (8, 9). Self-care practice scores were derived by a Likert scale which sought to determine whether the respondents always "2", sometimes "1" or never "0": a) took medication as prescribed; b) exercised for at least 30 minutes every day; c) maintained a normal weight; d) ate small meals throughout the day; e) ate high fibre, low fat foods every day; f) ate vegetables every day; g) took special care of their feet; and h) kept their appointments at the clinic. The eight areas were each scored on a scale of 0–2 and the score converted to a percentage for reporting. An overall score > 80% was considered to be "adequate" self-care. Other variables were explored through open-ended questions. A dietary recall of "usual foods and drinks" consumed in a "usual" day was also done and the reported sugar content estimated (g/week). Blood pressure (BP) was measured with the patient in the sitting position (13). Body mass index (BMI) waist circumference (WC) (14) and a foot inspection were carried out (15). Anthropometric measurements were done by two of the researchers and the mean of two measurements recorded. HbA_{1c}, the indicator of glycaemic control, was determined using a DCA analyzer (Bayer©).

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 11.0. Spearman's correlation coefficient was used to explore associations between the variables. Between gender differences were tested using Mann-Whitney *U* non-parametric tests. The estimated minimum sample size was 122 with a power of 80%. A *p*-value # 0.05 was taken as significant.

Qualitative data were analyzed by sorting texts and coding them into themes which were used to describe the ideas of the subjects.

RESULTS

Thirty-five (26%) men and 98 (74%) women completed the interview, anthropometric and blood pressure measurements. Characteristics of the respondents are shown in Table 1.

Sixty-four per cent had primary education, 25% secondary, 7.5% tertiary, and 3% reported no formal education. Fifty per cent were married, 28% single, 11% widowed, 7% divorced or separated and 4% were in common-law unions. The men were significantly older, median age, 62 years (z = -2.64, $p = 0.008$) than the women, median age, 55 years.

Table 1: Characteristics of men and women with diabetes mellitus.

	Women (n = 98)			Men (n = 35)			Men and women (n = 133)		
	Median	Quartiles	Range	Median	Quartiles	Range	Median	Quartiles	Range
Age (yrs)	55	47 64	23–89	62	53 73	20–90**	57	47.5 66.5	20–90
Duration (yrs)	10.5	5 19	0.8–34	7	3 20	1–42	10	0.8 42	4–19
BMI (kg/m^2)	30.4	26.7 34.3	18–47.4	27.4	24 29.7	16.6–38	29.1	25.8 33.8	16.6–47.4
Waist (cm)	100.4	92 110	69–129	98.7	89 106	69.5–123.8	99.7	99.1 107.8	69.3–129
SBP (mmHg)	138.5	120 155	99–205	150	129 160	102–205	140	121.5 156.5	99–205
DBP (mmHg)	81	71.7 92	60–120	88	76 92	59–122	82	73.5 92	59–122
Exercise (h/wk)	1.5	0 3.6	1–15	1.5	0 3.5	0–14	1.5	0.0 3.5	0–15
Inactivity (h/wk)	14	12 16	9.5–23	16.5	12 20	9–23	14	12 17	9–23
HbA_{1c} (%)	8.4	6.9 10.3	4.8–14	7.2	6.5 10	5.3–13	8.2	6.7 10.3	8–14
Sugar (g/wk)	141	35 238	0–672	70	35 168	0–490	119	35 238	0–672

** men significantly older than women, BMI = body mass index, SBP = systolic blood pressure, DBP = diastolic blood pressure, h/wk = hours per week; g/wk = grams per week, Duration = duration of diabetes. HbA_{1c}: men (n = 33), women (n = 89).

Ninety-nine per cent had Type 2 diabetes and 69% were being treated with insulin, with combined insulin and oral hypoglycaemic agents (OHAs) or OHAs (metformin, chlorpropamide, glibenclamide and gliclazide) only. The median insulin dose was 55 U/day, range 5–179 U/day. The proportion of men and women taking insulin and the doses of insulin were similar. There were no significant differences in HbA_{1c} between those receiving insulin and those taking oral hypoglycaemic agents only. Only 23% had blood glucose controlled to HbA_{1c} # 6.5%. Only nine (7%) respondents reported the regular use of a portable glucose monitor.

Eighty-six (65%) had been prescribed antihypertensive agents but only 36 (27%) had blood pressure # 130/80 mm Hg. Sixty per cent of men and 40% of women reported full compliance with medications. The others (55%) reported missing medications between 1–15 days per month. Men missed significantly fewer days of medication than women (z = -2.2, p = 0.03). HbA_{1c} levels in women were associated with the number of days in the month that medications were missed ($r = 0.38$, $p < 0.001$). HbA_{1c} was also inversely related to compliance with medication ($p = 0.004$) scores in the self-care practice scale.

The median overall self-care practice scale score was 69%, range 38–100%, inter quartiles 58–80%. The factors on the self-care practice scale that ranked highest were keeping clinic appointments and taking care of feet. The lowest were in the areas of weight control and exercise. Forty-nine per cent of men and 75% of women scored < 80% on the overall practice scale. The overall practice scale score for men was significantly higher than for women (z = -2.1, p = 0.03). The men scored higher than women in all areas except in the care of feet and were equal in their consumption of high fibre/low fat foods (Table 3). In men, HbA_{1c} levels were inversely related to keeping clinic appointments (p = 0.04), the intake of high fibre/low fat foods (p = 0.02) and vegetables (p = 0.02).

Eighty-one per cent had a body mass index (BMI) $ 25kg/m^2 (Table 2). Waist circumference correlated with BMI (r = 0.83, p < 0.001). Forty-six per cent recognized diet and/or overweight as contributing to their diabetes. Eighty-five per cent had consulted a dietitian but only 56.4% reported that they followed a "special diet". Only 16.5% reported not taking any sugar. Twenty-one per cent of the respondents took multivitamin supplements.

Seventy-one per cent exercised < 3.5 hours per week, 32% reported taking no exercise. The respondents were inactive (sitting or lying down) a median of 14 hours/day.

Table 2: Body Mass Index (kg/m^2) categories in adults with diabetes

BMI (kg/m^2)	Men (n = 35)	Women (n = 98)
	Frequency (%)	Frequency (%)
Underweight (<18)	2 (5.7)	1 (1.0)
Normal weight (18–24.9)	9 (25.7)	13 (13.3)
Overweight (25–29.9)	16 (45.7)	34 (34.7)
Obese (30–39.9)	8 (22.9)	45 (45.9)
Morbidly obese (> 40)	0 (0)	5 (5.1)
Total	**35 (100)**	**98 (100)**

Table 3: Self-care practice scale scores of men and women with diabetes

Areas of self-care	Men (n = 35) Mean Rank	Women (n = 98) Mean Rank	*Z*	*P*
Takes special care of feet	56.8	70.7	-2.8	0.005**
Keeps clinic appointments	70.9	65.6	-1.1	0.28
Includes high fibre/low fat foods daily	72.2	65.1	-1.1	0.28
Eats vegetables every day	67.0	67.0	0.0	1.00
Takes medication as prescribed	76.0	63.8	-1.8	0.07
Eats small meals throughout the day	77.8	63.2	-2.2	0.03*
Exercises 30 minutes daily	67.3	66.9	-0.5	0.96
Maintains normal weight	86.4	60.1	-3.7	<0.001**

Significant difference between men and women *p < 0.05, **p < 0.01 Mann Whitney *U*

Exercise duration was inversely related to age (r = -0.29, p = 0.001) and inactivity (r = -0.25, p = 0.004) and positively related to overall self-care practice scores (r = *0.24*, p = 0.008). These scores were inversely related to HbA_{1c} (r = -0.24, p = 0.008), BMI (r = -0.25, p = 0.005), and reported sugar intake (r = -0.22, p = 0.01) but inversely related to age only in men (p = 0.04). The high scores in foot care were supported by the foot inspection (15): median foot inspection score, 75%, range 20–100%. The majority had feet that were clean and free of cracks, and calluses, toe nails cut appropriately and wore protective footwear. Seventy-five (57.3%) had had their feet examined by a physician within the previous year. The majority (81%) of the respondents had attended an eye clinic within the previous year, 90% within two years. Of the nine (7%) who reported that they did not know how to care for their eyes, three were blind. Forty-nine per cent had dental care in the previous two years; 38% had not seen a dentist for over four years. Thirty-three per cent were edentulous. Only 10% of respondents reported having all their teeth.

Five (3.5%) respondents reported taking alcohol but only one exceeded 12 units/week. Seven (5%) reported smoking. Of these, three males reported regular use of marijuana. Thirty (22.6%) respondents reported using a variety of herbal remedies ("bush teas"); for example, eight reported the regular use of cerasee (*Momordica charantia L*).

DISCUSSION

Overweight or obesity substantially increases the risk of morbidity and mortality from diabetes mellitus and other major illnesses (14). The majority of respondents were overweight or obese with central adiposity and did not practice "adequate" self-care. Medication compliance was suboptimal and was significantly associated with poor glycaemic control in two measurements in the women. Blood glucose and blood pressure were poorly controlled. Sugar intake was related to BMI and inversely related to the overall self-care practice scale scores.

The unequal proportion of men and women (1: 2.8) in this random sample is similar to that of a study, conducted nearly 20 years previously, in the same clinic (16). The preponderance of females reflects the higher population prevalence of obesity and DM in Jamaican women (17). The prevalence of obesity and hypertension was similar to this study, but the mean HbA_{1c} in the previous study was almost twice that of our study: 15.5% (± 4.2) *vs* 8.7% (± 2.4), suggesting an improvement in glycaemic control and/or differences in the laboratory assays (16). The men in this study were significantly older than the women and although their self-care practice scores were higher, these scores were inversely related to their ages. This suggests that, as they grow older, their ability to care for themselves may diminish. Glycaemic control in the men was associated with keeping clinic appointments and maintaining their daily intake of high fibre/low fat foods; in women it was associated with medication compliance.

It had been reported previously that clinic staff seldom advised patients on diet, exercise and the other aspects of non-pharmacological management (4). This was not the experience in this clinic but despite this, medication compliance, exercise and weight control were suboptimal. The high proportion of patients screened for diabetic retinopathy and for diabetic foot complications had not been observed previously (4).

The relationships between waist circumferences, BMI, self-care practice scores, sugar intake and blood glucose are logical. The high sugar intake may be due to a cultural preference for highly sweetened beverages and may have been under-reported.

Many patients had only one visit with the dietitian and defaulted from follow-up, indicating a general reluctance to make dietary changes. Many of the patients were taking high doses of insulin and were still not controlled. This is consistent with the insulin resistance of obesity/overweight and confirms the importance of diet in metabolic control (18).

In Jamaica, there is a cultural acceptance of obesity especially in women (19). Fewer than half of the subjects recognized poor diet and/or overweight as contributing to their diabetes. Firmly rooted social and economic factors actively encourage over-eating and sedentary behaviour and discourage alterations in these patterns (20). Indiscriminate eating patterns could have a direct and unfavourable influence on weight management and glycaemic control. The lack of long term dental care could also affect dietary compliance.

Only a few persons smoked cigarettes or marijuana or ingested alcohol. This reflects the comparatively low prevalence of tobacco and alcohol use in the Jamaican population, especially among women (21).

A few used herbal remedies in the form of "bush teas". Although these have been shown to have some influence on blood glucose levels, and renal and hepatic function, this study could not determine whether sufficient quantities were ingested to exert any pharmacological and/or toxic effects (22).

The physician's advice is important to the patient (23). This was reflected in the improved care of feet and eyes. However, insufficient importance was given to weight control and exercise against a background where being fat is culturally preferred (19). The lack of medication compliance and poor control especially in women is a cause for concern.

This study agrees with the findings of the previous study which indicated "unsuccessful dietary management and compliance" at this clinic (16). This study identified several gaps in self-care and indicated the need to develop a collaborative, patient centred approach to deliver effective dietary advice, exercise, weight control, blood glucose monitoring and to improve medication compliance (11).

Patients' self-care practices should be monitored along with other indicators of quality of care.

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