

# Management of diabetes mellitus and hypertension at UNRWA primary health care facilities in Lebanon

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## معالجة السكري وضغط الدم المرتفع في عيادات الرعاية الصحية الأولية التابعة للأمم المتحدة في لبنان

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خلاصة: أجريت دراسة وصفية مقطعية في سائر مراكز الرعاية الصحية الأولية التابعة للأمم المتحدة في لبنان، من أجل تقدير نوعية الرعاية المقدمة للسمايين بالسكري وضغط الدم المرتفع. ولقد روجعت في هذه الدراسة سجلات 2202 مريضاً بهاتين الحالتين. وتبين وجود المرضين في سن مبكرة (أقل من 40 سنة)، حيث كانت أهم عوامل الإختطار وجود تاريخ عائلي والسمنة وحياة الخمول. وكانت المضاعفات الرئيسية هي الأمراض القلبية الوعائية، ومن بعدها اعتلال الشبكية. ولقد تم تحديد تدابير ذات مردود عملي للارتقاء بتنظيم خدمات الرعاية الصحية وتحسين إدارتها.

**ABSTRACT** A cross-sectional descriptive study was conducted at all UNRWA primary health care facilities in Lebanon Field, to assess the quality of care of diabetes mellitus and hypertension. The study reviewed 2202 records of diabetic and hypertensive patients. Both diseases were present at an early age (< 40 years), with family history, obesity and sedentary lifestyle being the main risk factors. The major complication was cardiovascular disease followed by retinopathy. Action-oriented measures to improve the organization and management of the health care services were identified.

## La prise en charge du diabète sucré et de l'hypertension dans les établissements de soins de santé primaires de l'UNRWA au Liban

**RESUME** Une étude descriptive transversale a été réalisée dans tous les établissements de soins de santé primaires du champ libanais de l'UNRWA afin d'évaluer la qualité des soins dispensés pour le diabète sucré et l'hypertension. L'étude a passé en revue 2202 dossiers de diabétiques et d'hypertendus. Les deux maladies étaient présentes à un âge précoce (< 40 ans), les antécédents familiaux, une obésité et un mode de vie sédentaire étant les principaux facteurs de risque. Les maladies cardio-vasculaires constituaient la principale complication, suivies par les rétinopathies. Des mesures pragmatiques en vue d'améliorer l'organisation et la gestion des services de santé ont été identifiées.

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## Introduction

The noncommunicable disease (NCD) prevention and control programme of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) covers two common diseases: diabetes mellitus and hypertension. In 1969, a diabetes special care clinic was established at the Beirut polyclinic. Later in the 1970s and 1980s, the diabetes programme was expanded to include more clinics until 1990, when diabetes care was fully integrated within UNRWA's primary health care activities. The hypertension control programme started in the late 1980s. Both programmes were dealt with separately until the new approach to prevention and control of NCDs was fully developed in 1995. By the beginning of 1998, updated instructions on the subject were introduced. It is worth mentioning that the revised instructions established more refined criteria for the definition of acceptable glycaemia and hypertension control [1].

This study was the outcome of a workshop on epidemiology conducted in 1997, coordinated by UNRWA and the World Health Organization (WHO) Collaborating Centre at the Centres for Disease Control and Prevention (CDC), Atlanta, United States of America (USA). The objectives of the study were to determine the prevalence of risk factors and complications in diabetic and hypertensive patients, and to assess the level of care extended to these patients at each NCD clinic. The purpose was to identify areas of weakness where training and supervision are needed.

## Patients and methods

The NCD prevention and control programme in UNRWA Lebanon Field cared for approximately 4000 diabetic and 3000 hypertensive patients in 1997. The pro-

gramme covers management of the disease and its complications through a comprehensive primary health care (PHC) programme implemented in 24 health centres throughout Lebanon. The programme has an active early detection component in addition to a public health education component supported by limited secondary and tertiary care through contractual agreements with private and nongovernmental organization (NGO) hospitals. The programme is also supported by a series of laboratory services available within the health centres. PHC activities are complemented by specialist services of cardiology and ophthalmology for examination of patients referred to them and for training of staff.

Every patient has an NCD patient registration file (PRF) at the health centre closest to their place of residence. The PRF contains the following information: 1) personal data [name, serial number, year of registration, date of birth, sex, morbidity condition(s), year of diagnosis of the condition(s), height, weight and body mass index (BMI)]; 2) risk factors (family history, obesity, smoking, hyperlipidaemia, urinary problems, hyperuricaemia and sedentary lifestyle); 3) complications (cardiovascular, cerebrovascular, renal, peripheral vascular, ophthalmic and neuropathy); 4) laboratory tests [postprandial blood glucose (PPBG), serum cholesterol, serum triglyceride, blood urea nitrogen (BUN), creatinine, routine urine analysis, microalbuminuria, complete blood count and others]; 5) general appraisal; and 6) management during each visit [date, blood pressure (BP) result, physical findings (weight and BMI), type of treatment and date and time of next visit].

A cross-sectional descriptive study was conducted in June and July, 1998 at all NCD clinics in UNRWA, Lebanon Field using the PRFs of all registered diabetic and hypertensive patients who visited these

clinics in 1997. Stratified random sampling was used in sample selection to allow a comparison between various clinics. The basis for calculation of sample size was the level of glycaemia and hypertension control reported in the 1997 annual reports on diabetes mellitus and hypertension. The reported percentage of glycaemia control was 51.3% and that of hypertension control was 47.6% [2]. The sample for each disease was considered separately at each clinic. The sample for type 1 diabetes was 50% of the available files at every clinic.

The percentage of glycaemia control was set at  $50 \pm 10\%$  at the 95% confidence intervals, and hypertension control was set at  $45 \pm 10\%$ . The total number of surveyed type 2 diabetes patients was 1076, type 1 diabetes patients was 84 and hypertension patients was 1042.

A questionnaire was designed for data collection, which was filled by trained supervisory staff. The questionnaire was tested at two of the large clinics. Data were analysed using *Epi-Info* (version 6.04). The chi-squared test was used to test the significance of the variations among NCD clinics for various variables in terms of control. The 5% level was chosen as the level of significance.

## Results

### Age and sex distribution

Females constituted over two-thirds of type 2 diabetes and hypertensive patients, while males and females were almost equally affected in type 1 diabetes. A total of 4.1% of type 2 diabetes patients and 4.0% of hypertensive patients were < 40 years of age. Two-thirds of type 1 diabetes patients fell in this age group. About half of the selected patients were  $\geq 60$  years. They were distributed proportionately between both sexes

for type 2 diabetes but males constituted a higher proportion than females for hypertension. Only 9.5% of type 1 diabetes patients were over 60 years of age, distributed proportionately between both sexes.

### Prevalence of risk factors

The main risk factors associated with type 2 diabetes were age, family history, obesity and sedentary lifestyle. The association between family history and the development of type 2 diabetes decreased with increasing age for both sexes and age and other risk factors became more important. The effect of obesity did not change with age. On the other hand, sedentary lifestyle contributed more to the development of type 2 diabetes as age advanced, and this effect was more prominent among males.

The proportion of patients with risk factors for hypertension did not differ greatly from that of those with type 2 diabetes as shown in Figure 1. A family history of hypertension played an important role in the onset of this disease at an early age in both males and females, as did obesity and smoking.

### Prevalence of late complications

We found that 41.9% of all the surveyed patients had at least one of the late complications: 46.3% of type 2 diabetes patients and 37.8% of patients with only hypertension.

Confining the analysis to those diabetics without hypertension showed that 32.2% of them had at least one of the late complications. The difference in the prevalence of complications among type 2 diabetes patients with and without hypertension was statistically significant ( $P = 0.01$ ). This indicates that the presence of both diseases increases the risk for development of late complications.

Over one-quarter of all the patients included in the study suffered from cardiovascular disease, with no difference between type 2 diabetes and hypertensive patients, 28.2% and 28.3% respectively (Figure 2). There was no sex difference in the occurrence of cardiovascular disease in both types of patients. On the other hand, only 15.5% of type 1 diabetes patients suffered from cardiovascular disease. Figure 2 also shows that the same distribution applies to the development of cerebrovascular disease: 4.8% for type 2 diabetes, 4.0% for hypertension and only 1.2% for type 1 diabetes. Of all the patients, 16.6% suffered from retinopathy, mostly the diabetic patients. The development of nephropathy, retinopathy, neuropathy and peripheral vascular disease was more pronounced in diabetic patients than in hypertensive patients as shown in Figure 2.

Figure 3 shows that the prevalence of complications generally increased with the duration of type 2 diabetes and this was true for both sexes. This trend was more evident in diabetes than in hypertension.

The presence of early kidney damage was checked in 38% of the diabetic patients with a microalbuminuria (M/A) test. Of these, 15.0% of type 2 diabetes patients and 7.7% of type 1 diabetes patients had a positive M/A test, with female diabetics showing a higher prevalence than males, 16.6% compared with 10.5% respectively. The prevalence of proteinuria among type 2 diabetes patients was 12.2% and recorded nephropathy was 7.2%.

The prevalence of hypertension among patients with type 2 diabetes was 49.5% and it varied between clinics ranging from as low as 16.1% to as high as 75.6%. The prevalence of hypertension among type 2 diabetes patients was below the overall average in 15 out of the 24 clinics.

### Control of lipid disorders in diabetes

UNRWA's technical guidelines on NCD prevention and control aim at acceptable control of diabetes [1]. Acceptable cholesterol control in diabetes is set by WHO and the International Diabetes Federation (IDF) at 250 mg/dL and acceptable triglyceride control at 200 mg/dL [3]. The study showed that 88.6% and 66.9% of patients with type 2 diabetes had attained an acceptable level of cholesterol and triglyceride control respectively. This level increased among patients living in rural areas (Taalabaya and Wavel clinics) as shown in Table 1.

Over-production and decreased clearance of very-low-density lipoprotein (VLDL) triglycerides have been observed in poorly controlled but nonketotic patients with type 1 diabetes [4]. Poorly controlled type 1 diabetes patients (16.7%) had a total triglyceride level higher than 350 mg/dL compared with only 5.6% of those whose diabetes was well controlled. The corresponding figures for type 2 diabetes were 11.3% and 6.7% for poorly controlled and well controlled patients respectively.

The mean serum cholesterol level of type 2 diabetes patients was  $201 \pm 50$  mg/dL and the mean serum triglyceride level was  $199 \pm 131$  mg/dL. The mean cholesterol for males was significantly lower than that for females ( $P < 0.001$ ), while there was no significant difference between the means of triglyceride levels for both sexes ( $P = 0.56$ ).

The mean cholesterol level ( $185 \pm 52$  mg/dL) and the mean triglyceride level ( $170 \pm 154$  mg/dL) for type 1 diabetes patients were lower than those for type 2 diabetes patients. The difference between the means for both sexes was statistically significant for triglycerides but not significant for cholesterol.

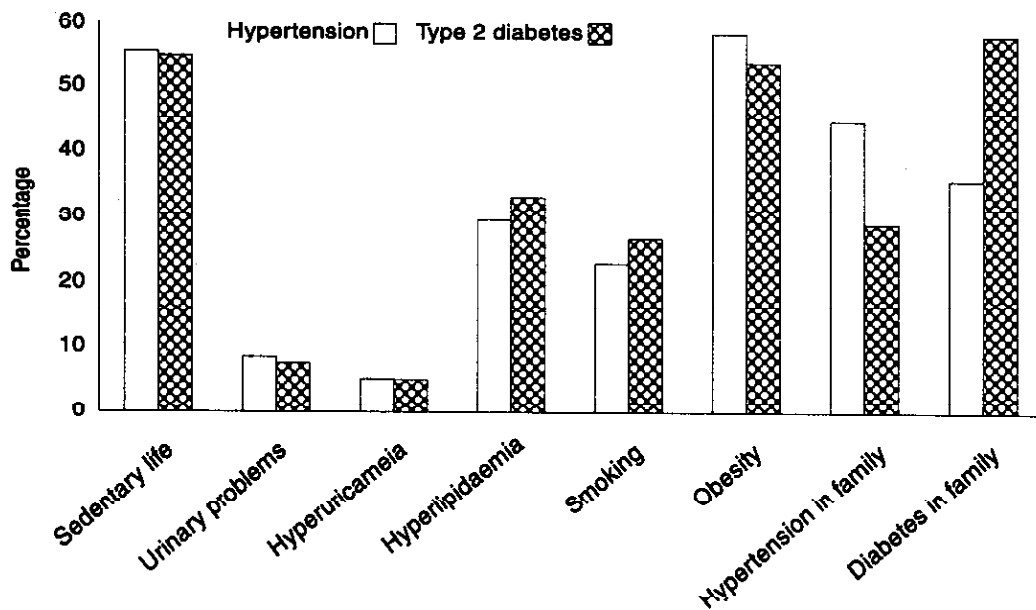


Figure 1 Prevalence of risk factors in patients with hypertension and type 2 diabetes mellitus at the time of diagnosis

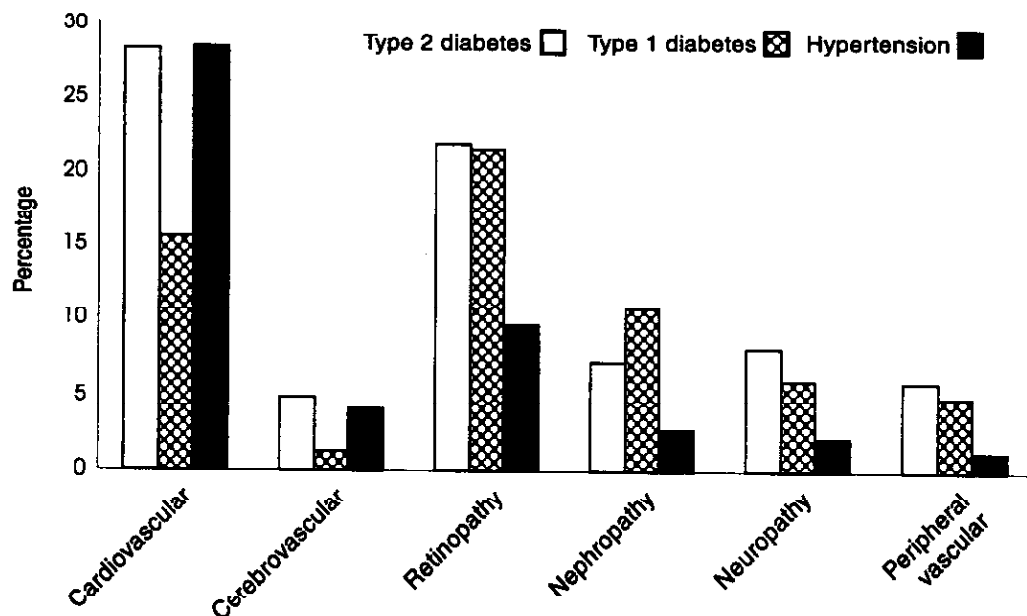


Figure 2 Prevalence of late complications in patients with diabetes mellitus and hypertension

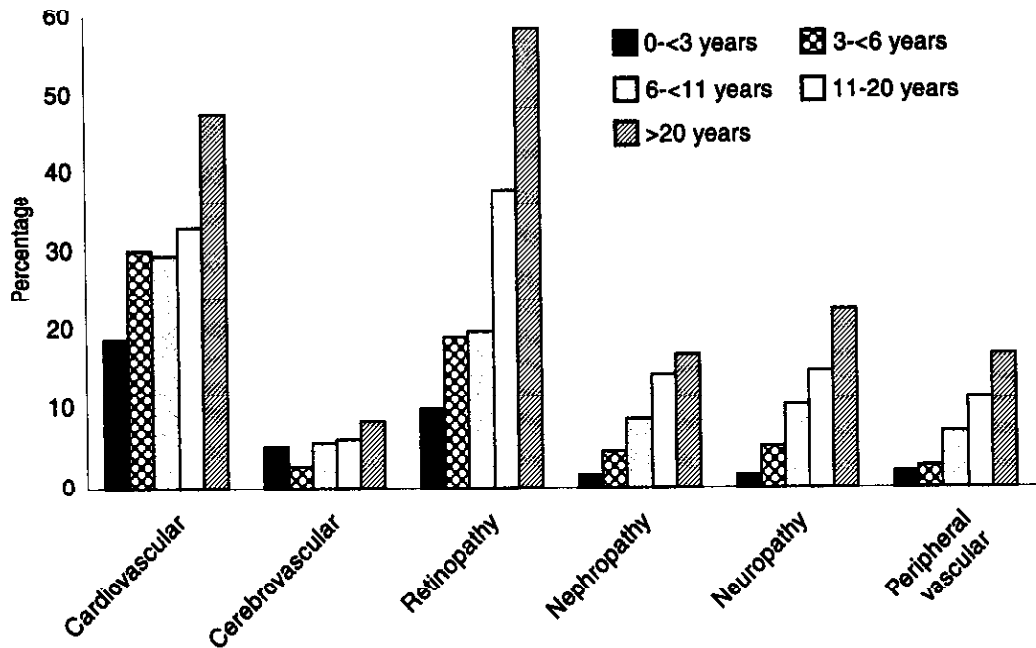


Figure 3 Prevalence of complications in patients with type 2 diabetes mellitus by duration of the condition

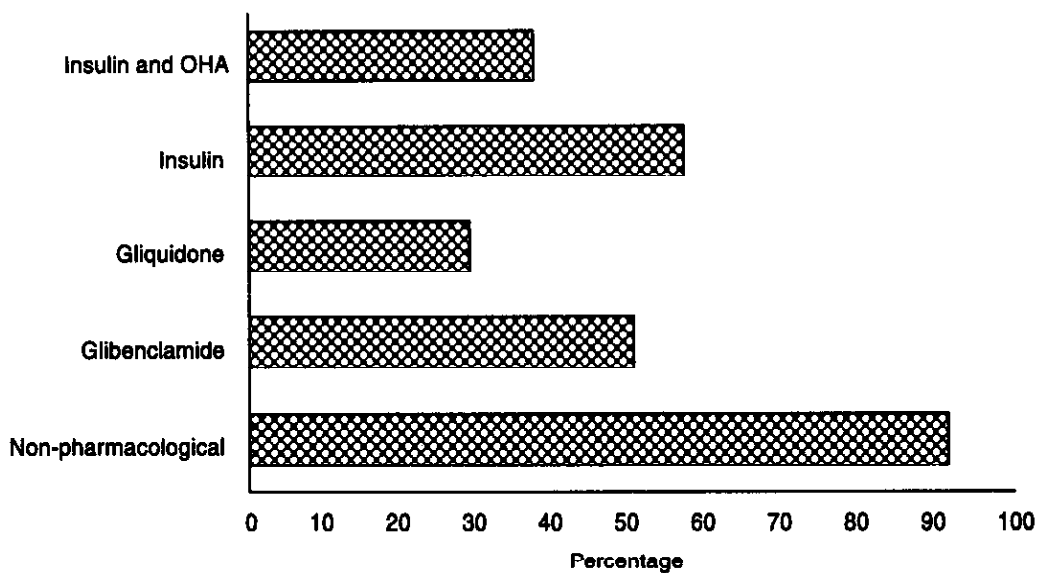


Figure 4 Level of glycaemia control by type of management of diabetes

The prevalence of hypercholesterolaemia (serum cholesterol  $\geq$  250 mg/dL) among hypertensive patients was 9.8%, while the prevalence of hypertriglyceridaemia (serum triglyceride  $\geq$  200 mg/dL) was 20.4%.

The prevalence of hyperlipidaemia was lowest in patients who had had diabetes for less than 3 years. After 3 years, the prevalence of hypercholesterolaemia increased and remained the same, while the triglyceride level was highest for patients with duration of the disease for 3–6 years.

The mean of serum cholesterol and that of serum triglyceride were high among newly diagnosed hypertensive patients. This reflects the presence of the disease for periods before diagnosis and the high prevalence of obesity.

### Management of type 2 diabetes

Only 18.2% of diabetic patients were managed by lifestyle modification. This mode of therapy decreased with the increase in the duration of disease, and none of those with over 20 years duration of diabetes was on nonpharmacological treatment. With intensified early detection activities, this mode of treatment should increase. Of type 2 diabetes patients, 68.6% were on oral antidiabetic agents (OHA), 8.1% on insulin therapy and 5.1% on combined insulin and OHA. The use of the last two modes of therapy increased steadily with the duration of diabetes.

### Glycaemia control

An acceptable glycaemia control level is defined as a value of PPBG of 200 mg/dL attained at two of the last three regular visits provided there are no large fluctuations in value. Table 2 shows that 55.7% and 64.7% of type 2 and type 1 diabetes patients respectively had achieved acceptable control. The level of acceptable glycaemia

control in type 2 diabetes varied among clinics and ranged from as low as one-quarter of the patients in some clinics to as high as three-quarters in others.

In 1998, a new cut-off point of PPBG level was introduced: 180 mg/dL. Application of this cut-off point reduced the percentage of patients with good control to 43.4%, a drop of 28.3%. Figure 4 shows that the level of glycaemia control was highest for those patients managed by non-pharmacological methods. These patients were mostly newly diagnosed.

A subjective question was included in the study to determine if the medical officer had increased or decreased the dose of the medication, or shifted from one mode of management to another if the acceptable control criteria were not met. A total of 72.9% of type 2 and 74.1% of type 1 diabetes patients were judged as correctly managed. This does not mean that the diabetic patients were on the correct dosage and type of management. It only indicates that the medical officer was aware of the control criteria and used the blood glucose result to manage the patient properly.

### Type of management of hypertension in diabetes

Only 17.7% of diabetic patients with hypertension were on lifestyle modification as the type of management for hypertension. Some patients (17.6%) were on angiotensin-converting enzyme (ACE) inhibitors and/or calcium-channel blockers. On the other hand, 32.2% of these patients were on antihypertensive drugs that should be used with caution in diabetes. These figures do not include 22.4% of the patients who were on three or more drugs.

### Management of hypertension

Technical guidelines state that management of hypertension without co-existing condi-

tions should start with lifestyle modification, followed by hydrochlorothiazide. If these fail to control the blood pressure, a beta-blocker is substituted for hydrochlorothiazide. If the beta-blocker fails, a combination of both beta-blocker and hydrochlorothiaz-

ide is tried. If these fail, then the more expensive drugs can be tried. Each trial period extends for 4–6 weeks.

Table 3 shows that only 9.4% of all patients with hypertension were on lifestyle modification, 3.1% on hydrochlorothiaz-

**Table 1 Control of cholesterol and triglycerides in type 2 diabetes mellitus by noncommunicable disease (NCD) prevention and control clinics**

NCD clinic	Cholesterol control				Triglyceride control			
	Good (< 200 mg/dL)		Acceptable (< 250 mg/dL)		Good (< 150 mg/dL)		Acceptable (< 200 mg/dL)	
	No.	%	No.	%	No.	%	No.	%
Beirut PC	50	61.0	70	85.4	33	40.2	51	62.2
Mar Elias	31	60.8	46	90.2	22	43.1	29	56.9
Burj el-Barajneh	37	56.1	62	93.9	29	43.9	45	68.2
Shatila	29	56.9	45	88.2	20	39.2	32	62.7
Dbayeh	15	53.6	24	85.7	13	46.4	22	78.6
Burj el-Hammoud	30	51.7	53	91.4	20	34.5	36	62.1
Taalabaya	35	85.4 <sup>a</sup>	41	100 <sup>a</sup>	24	58.5	37	90.2 <sup>a</sup>
Wavel	42	95.5 <sup>a</sup>	44	100 <sup>a</sup>	41	93.2 <sup>a</sup>	44	100 <sup>a</sup>
Beddawi	36	56.3	59	92.2	30	46.9	44	68.8
Mina	22	48.9	44	97.8 <sup>a</sup>	18	40.0	28	62.2
Nahr el-Bared	30	43.5	60	87.0	16	23.2 <sup>a</sup>	43	62.3
Saida PC	35	45.5	71	92.2	28	46.4	45	58.4
Ein el-Hilweh	45	54.9	74	90.2	29	35.4	56	68.3
Nabatieh	10	54.9	17	73.9 <sup>a</sup>	10	43.5	19	82.6
Mieh Mieh	10	38.2	22	84.6	16	61.5	17	65.4
Adloun	16	84.2 <sup>a</sup>	17	89.5	13	68.4 <sup>a</sup>	15	78.9
Ghazieh	10	43.5	15	65.2 <sup>a</sup>	12	52.2	16	69.6
Shehim	10	66.7	14	93.3	9	60.0	12	80.0
El-Buee	20	31.3 <sup>a</sup>	51	79.7 <sup>a</sup>	27	42.2	36	56.3
Rashidieh	23	41.1	44	78.6 <sup>a</sup>	22	39.3	39	69.6
Burj el-Shemali	25	51.0	43	87.8	23	46.9	34	69.4
Maashouk	12	70.6	16	94.1	4	23.5	9	52.9
Shabriha	7	50.0	11	78.6	5	35.7	6	42.9
Qasmieh	5	41.7	10	83.3	4	33.3	5	41.7
Total	585	54.4	953	88.6	468	43.5	720	66.9

<sup>a</sup>Significantly different from the population average ( $P < 0.05$ )



ide, 11.2% on beta-blockers and 14.2% on ACE inhibitors and calcium-channel blockers. The use of other antihypertensive drugs ranged from 1.8% for furosemide to 6.6% for methyldopa. A combination of drugs was frequently used.

The proportion of patients on lifestyle modification decreased as the duration of hypertension increased. The percentage of patients on three or more drugs increased with the duration of disease until 10 years,

**Table 2 Level of glycaemia control by noncommunicable disease (NCD) prevention and control clinics and type of diabetes**

NCD clinic	Type 2 diabetes mellitus				Difference as %	Type 1 diabetes mellitus	
	200 mg/dL		180 mg/dL			No.	%
	No.	%	No.	%			
Beirut PC	52	63.4	34	41.5	52.8	4	50.0
Mar Elias	30	58.8	26	51.0	15.3	5	62.5
Burj el-Barajneh	35	53.0	29	43.9	20.7	3	75.0
Shatila	23	45.1	16	31.4 <sup>a</sup>	43.6	1	100
Dbayeh	22	78.6 <sup>a</sup>	14	50.0	57.2	0	0.0
Burj el-Hammoud	44	75.9 <sup>a</sup>	34	68.6 <sup>a</sup>	29.5	—	—
Taalabaya	26	63.4	21	51.2	23.8	0	0.0
Wavel	20	45.5	16	36.4	25.0	0	0.0
Beddawi	36	56.3	24	37.5	50.1	4	66.7
Mina	28	62.2 <sup>a</sup>	27	60.0 <sup>a</sup>	3.7	2	66.7
Nahr el-Bared	34	49.3	26	37.7	30.8	0	0.0
Saida PC	44	57.1	38	49.4	15.6	15	100
Ein el-Hilweh	50	61.0	48	48.8 <sup>a</sup>	25.0	6	66.7
Nabatieh	15	65.2	10	43.5	49.9	3	75.0
Mieh Mieh	20	76.9 <sup>a</sup>	18	69.2 <sup>a</sup>	11.1	1	100
Adloun	13	68.4	8	42.1	62.5	—	—
Ghazieh	13	56.5	11	47.8	18.2	—	—
Shehim	8	53.3	7	46.7	14.1	1	100
El-Buss	15	23.4 <sup>a</sup>	12	16.0 <sup>a</sup>	24.5	6	75.0
Rashidieh	14	25.0 <sup>a</sup>	11	19.6 <sup>a</sup>	27.6	1	100
Burj el-Shemali	33	67.3	25	51.0	32.0	2	100
Maashouk	10	58.8	8	47.1	24.8	—	—
Shabriha	6	42.9	5	35.7	20.2	—	—
Oasmieh	8	66.7	7	58.3	14.4	—	—
Total	599	55.7	475	43.4	28.3	55	64.7

<sup>a</sup>Significantly different from the population average ( $P < 0.05$ )

Table 3 Type of management of hypertension by duration of the disease

Type of management	Duration of hypertension (years)												Total	
	0-3		3-6		6-11		11-20		> 20		No.	%		
	No.	%	No.	%	No.	%	No.	%	No.	%				
Nonpharmacological	95	63.8	34	22.8	15	10.1	4	2.7	1	0.7	149	9.4		
Esidrex (hydrochlorothiazide)	31	63.3	8	16.3	7	14.3	3	6.1	0	0.0	49	3.1		
Beta-blocker	79	44.4	43	24.2	34	19.1	20	11.2	2	1.1	178	11.2		
Lasix (furosemide)	13	44.8	9	31.0	4	13.8	3	10.3	0	0.0	29	1.8		
Esidrex anc beta blocker	41	41.4	28	28.3	21	21.2	8	8.1	1	1.0	99	6.2		
Aldomet (methyldopa)	30	28.6	38	36.2	27	25.7	9	8.6	1	1.0	105	6.6		
Aldomet and Esidrex	35	31.3	36	32.1	28	25.0	12	10.7	1	0.9	112	7.0		
One drug and Lasix	46	31.9	43	29.9	39	27.1	13	9.0	3	2.1	144	9.1		
ACE inhibitor	49	44.5	28	25.5	17	15.5	13	11.8	3	2.7	110	6.9		
Calcium-channel blocker	16	33.3	17	35.4	11	22.9	4	8.3	0	0.0	48	3.0		
ACE and calcium-channel blocker	21	30.4	26	37.7	11	15.9	7	10.1	4	5.8	69	4.3		
Three or more drugs	98	22.8	116	27.0	139	32.4	64	14.9	12	2.8	429	27.0		
Other	19	27.5	28	40.6	15	21.7	7	10.1	0	0.0	69	4.3		
Total	573	36.0	454	28.6	368	23.1	167	10.5	28	1.8	1590			

ACE = angiotensin-converting enzyme

then dropped thereafter. The study showed that 79.2% of hypertensive patients had been managed correctly according to the blood pressure measurement.

The criteria for hypertension control of patients on lifestyle modification are: systolic blood pressure (SBP)  $\leq$  140 mmHg and diastolic blood pressure (DBP)  $\leq$  90 mmHg taken at two of the last three visits; and for patients on pharmacological therapy, SBP  $\leq$  160 mmHg and DBP  $\leq$  95 mmHg. Of all the hypertensive patients, 75.7% were well controlled. The poorest level of control was for patients on lifestyle modification (36.9%). The level of control for this group of patients was statistically lower than the overall average ( $P < 0.001$ ).

#### Compliance with appointments

NCD patients are given an appointment by day and time trimonthly or less, upon the discretion of the medical officer. Appointments are given after 11:00 hours, allowing 10 minutes for each patient. The number of sessions per week depends upon the number of patients registered at each clinic. The study showed that over half of the patients complied with the appointment time with no major differences between various categories of patients and between the first and second appointments. Clinics inside camps showed higher rates of compliance with appointments.

#### Discussion

The number of patients registered at NCD clinics in Lebanon Field does not reflect the real prevalence of diabetes and hypertension among the refugee population in that Field. At the end of 1997, it was around 4% for each type of diabetes and hypertension among persons aged  $\geq$  40 years, which is very low compared with those of the population of Lebanon and other countries in the

region [2]. Salti et al. showed that the prevalence of diabetes among people  $\geq$  30 years living in Beirut was 13.1% [5]. In Egypt, it was 9.3% among those aged  $\geq$  20 years as shown by Herman et al. [6]. Therefore, early detection activities should be intensified and applied in accordance with the technical guidelines on the subject. The age and sex distribution of patients reflects the types of patients who use the service: females more than males and older age groups more than the middle-aged.

The distribution of risk factors at the time of diagnosis of diabetes and hypertension was comparable to distributions reported by other studies [5-7]. The recognition of risk factors by patients and performance of laboratory tests needs to be investigated.

The overall prevalence of ischaemic heart disease is as high as 55% for adults with diabetes [8]. The study showed that the prevalence of cardiovascular disease among diabetics was 28.2% and that the prevalence of complications increased with the duration of disease.

The prevalence of late complications reported by international studies compared with those of this study shows that early detection of late complications leaves much to be desired in the course of monitoring each patient's condition [9-13]. Recording of results in the patient's file may be lacking in many instances, or there has been a relaxation in implementation of the technical guidelines on NCDs. Ophthalmologists, cardiologists and medical officers should be oriented towards early detection and recording of late complications of diabetes mellitus and hypertension.

The prevalence of hypertension in the diabetic population appears to be twice that in the nondiabetic population, and would be higher were it not for attrition caused by early mortality [14]. The prevalence of hy-

pertension among diabetics in the USA ranged from 60% to 70% as compared with a prevalence of 30%–40% in the nondiabetic population [15]. This study shows that only 50% of the diabetics were hypertensive. Proper measurement of the blood pressure and recording the result on the PRF might lead to an increase in the reported prevalence of hypertension.

It is clear that the recommended methods of diabetes management are followed to a certain extent. However, the proportion of patients on lifestyle modification and OHA should be reversed. Health personnel should exercise more restraint in shifting patients from nonpharmacological management to OHA, and should be rational in the use of OHA where nonpharmacological intervention can suffice.

Just over one-third of the patients who were on combined insulin and OHA therapy and over half of those on insulin were well controlled. The level of control of insulin-treated type 2 diabetes patients differed from that of type 1 diabetes patients. About one-half of type 2 diabetes patients who were on insulin treatment and about two-thirds of type 1 diabetes patients who

were ultimately on insulin were well controlled. This could be attributed to the difference in age, duration of disease and the level of compliance with treatment.

It is recognized that other factors are involved in the determination of the level of blood glucose that might result in high or low values. Nevertheless, good history-taking can give a view of the patient's condition which might affect, in one way or another, the test result, e.g. compliance with the management method, exercise, presence of concurrent disease.

The use of diuretics and beta-blockers in diabetics with hypertension might be because of the shortage of the more expensive drugs, such as ACE inhibitors or calcium-channel blockers.

Implementation of the appointment system is needed, especially in clinics located outside camps. Patients should be counselled on adhering to appointments. This should be the responsibility of all the staff involved in the implementation of the NCD prevention and control programme. Moreover, drugs for the programme should be available in sufficient quantities at each clinic at all times.

## References

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