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How frequently the clinical practice recommendations for nephropathy are achieved in patients with type 2 diabetes mellitus in a primary health-care setting?

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ABSTRACT

Objective. To determine the proportion of DM2 patients in primary health-care setting who meet clinical practice recommendations for nephropathy. **Material and methods.** 735 patients were included in this cross-sectional study. Nephropathy was defined as glomerular filtration rate < 60 mL/min/1.73 m^2 or albuminuria ≥ 30 mg/day. To estimate the proportion of patients meeting clinical practice recommendations, the achieved level was classified according to NKF –K/DOQI, ADA, IDF, JNC 7 report, and NCEP-ATPIII. **Results.** A high frequency of kidney disease and cardiovascular risk factors (smoking, alcoholism, obesity) was observed. Adequate levels were attained in 13% for fasting glucose, 45% for blood pressure, 71% for albuminuria, and 30% for lipids. Nephropathy was diagnosed in 41%. Adequate systolic blood pressure was observed in 40% of patients with nephropathy vs. 49% without nephropathy (p = 0.03). In both groups, body mass index was acceptable in one fifth of patients, and waist circumference in two thirds of men and one third of women (p = NS). Patients with nephropathy used more antihypertensives, particularly angiotensin converting enzyme inhibitors (nephropathy 49% vs. no nephropathy 38%, p = 0.004). Subjects with nephropathy received more frequently (p = 0.05) insulin (11%) than those without nephropathy (7%). In both groups, there was low use of statins (nephropathy 14% vs. no nephropathy 17%, p = 0.23), and aspirin (nephropathy 7% vs. no nephropathy 5%, p = 0.39). **Conclusions.** Recommended goals for adequate control of DM2 patients attending primary health-care units are rarely achieved, and this was independent of the presence of nephropathy. These findings are disturbing, as poor clinical and metabolic control may eventually cause that patients without nephropathy develop renal damage, and

¿Qué tan frecuentemente se logran las recomendaciones de guías de práctica clínica para nefropatía en pacientes con diabetes mellitus tipo 2 en un primer nivel de atención médica?

RESUMEN

Objetivo. *Determinar la proporción de pacientes con DM2 que alcanzan las recomendaciones de práctica clínica para nefropatía en un primer nivel de atención médica.* ***Material y métodos.*** *735 pacientes fueron incluidos en este estudio transversal. Se definió nefropatía como una tasa de filtración glomerular < 60 mL/min/1.73 m^2 o presencia de albuminuria ≥ 30 mg/día. Para estimar la proporción de pacientes que alcanzaron las recomendaciones de práctica clínica, el nivel alcanzado de diversas variables se clasificó de acuerdo con las guías NKF –K/DOQI, ADA, IDF, reporte 7 del JNC, y NCEP-ATPIII.* ***Resultados.*** *Se observó una alta frecuencia de enfermedad renal y factores de riesgo cardiovascular (tabaquismo, alcoholismo, obesidad). Sólo se observó niveles adecuados de glucosa sérica en ayuno en 13% de los casos, de hipertensión en 45%, de albuminuria en 71% y de lípidos en 30%. El 41% tuvo diagnóstico de nefropatía. Se observaron cifras adecuadas de presión arterial sistólica en 40% de los pacientes con nefropatía vs. 49% de los sujetos sin nefropatía (p = 0.03). En ambos grupos, el índice de masa corporal fue normal en sólo un quinto de los pacientes, mientras que la circunferencia de cintura fue aceptable en dos tercios de los hombres y un tercio de las mujeres (p = NS). Los pacientes con nefropatía usaron más antihipertensivos, particularmente inhibidores de la enzima convertidora de angiotensina (nefropatía 49% vs. no nefropatía 38%, p = 0.004). Además, los sujetos con nefropatía recibieron más frecuentemente (p = 0.05) insulina (11%) que aquellos sin nefropatía (7%). En ambos grupos hubo poco uso*

those subjects already with renal disease progress to renal insufficiency.

Key words. Type 2 diabetes mellitus. Chronic kidney disease. State of the art treatment. Clinical practice recommendations.

de estatinas (nefropatía 14% vs. no nefropatía 17%, p = 0.23), y aspirina (nefropatía 7% vs. no nefropatía 5%, p = 0.39). ***Conclusiones.*** *Los objetivos para el buen control de los pacientes con DM2 que acuden a unidades médicas de primer contacto de nuestro medio son raramente alcanzados y esto parece ser independiente de la presencia de nefropatía. Estos hallazgos son preocupantes, puesto que el pobre control clínico y metabólico puede finalmente causar que los pacientes sin nefropatía la desarrollen y aquellos ya con daño renal progresen a insuficiencia renal.*

Palabras clave. *Diabetes mellitus tipo 2. Enfermedad renal crónica. Tratamiento óptimo. Recomendaciones de práctica clínica.*

INTRODUCTION

Most individuals at early stages of chronic kidney disease (CKD) are largely undiagnosed and undertreated,[1-3] in consequence, end-stage renal disease (ESRD) is a growing health problem. Moreover, ESRD is associated with high morbidity, mortality and costs, and decreased quality of life.[1,4-6]

In the state of Jalisco,[7] Mexico as a country,[1] and in the most part of the world,[1,4-6] type 2 diabetes mellitus (DM2) is the leading cause of ESRD (~40%). Some advisory committees have published guidelines for detection and treatment of patients at high risk for CKD at early stages, particularly diabetics;[8-15] however, in practice, this early detection is not generally observed.[3,16-20] The advantage of such an early CKD detection is the implementation of measures recognized to reduce the risk and/or slow progression of diabetic nephropathy, which are most effective when initiated early in the course of renal disease.[8-15] In spite of the above, there is very little evidence that an appropriate treatment (according to the standards suggested by international expert committees) is provided to the majority of diabetic patients with renal disease.[3,16-21]

Diagnosing the current status of health-care provided to diabetics (a high risk population to develop CKD) will help to develop appropriate actions to counteract the impact of ESRD. Therefore, the purpose of this study was to estimate, in a cross-sectional evaluation, the proportion of DM2 patients attending our primary health-care setting who meet clinical practice recommendations for nephropathy as proposed by recognized expert committees/societies.

MATERIAL AND METHODS

In a previous cross-sectional study,[3] 756 DM2 patients aged 18 years or older of three primary health-care units [Unidades de Medicina Familiar (UMF) No. 3, 92, and 93] were randomly evaluated for early nephropathy; this sample size was capable of detecting conditions with a prevalence of at least 20% and with an estimation error of 5%. These three primary health-care units belong to the Instituto Mexicano del Seguro Social (IMSS) system in the city of Guadalajara, and are part of the 24 primary units of our setting. Evaluated patients were randomly selected from the registry of DM2 population attending each UMF. In all cases DM2 was previously diagnosed by family physicians (corroborated by investigators), according to the American Diabetes Association criteria,[22] but in no case a diagnosis of nephropathy was previously done.

Urinary albumin excretion (UAE) was evaluated by dipstick (*Micral-test II™, Roche Diagnostics GmbH*, Mannheim, Germany) in a first voiding urine sample once transitory causes of proteinuria (standing position, urinary tract infections, exercise, menstruation) were excluded by direct clinical exam and dipstick urinalysis. Positive results were confirmed by nephelometry (*Behring Nephelometer Analyzer II, Behring Diagnostics GmbH*, Marburg, Germany) in 24-hour urine collections. In addition, a detailed clinical exam, including neurological and eye examinations with direct ophthalmoscopy, was performed, and a blood sample was obtained (fasting of 12 h). Weight, height and waist circumference were measured according to standardized methods. Blood pressure was measured by a physician in all patients. Systolic and diastolic blood pressures were read on three separate occasions (with a 10-minute interval) according to criteria of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure;[12] a mean of these readings was used for analysis. In the blood sample, fasting glucose, creatinine, cholesterol and triglycerides were determined by usual methods in the Central Laboratory of the Hospital de Especialidades, CMNO, IMSS. Demographic and medical history was obtained from the clinical examination and

medical charts. From the original 756 patients of the previous study,[3] 735 with the appropriate information were included in the present analysis.

Definitions

Smokers were considered if they had smoked ≥ 100 cigarettes in their lifetime and continued to smoke at the time of the study. Alcoholism was defined as at least one episode of alcohol intoxication during the previous month. Cardiovascular disease was defined as the antecedent in medical records, or the presence at clinical examination, of heart failure, myocardial infarction, arrhytmias, EKG abnormalities, or cerebrovascular accidents. Retinopathy was defined as the presence of background or proliferative lesions in the clinical exam, or as the evidence in medical charts of previous diagnosis done by an Ophthalmologist. Peripheral neuropathy was diagnosed when the patient failed three out of five times to detect the presence of a 10 g monofilament (*Neuropen R, Owen Mumford,* Oxford, UK) applied on the foot. Hypertension was defined as a systolic blood pressure ≥ 140 mmHg and/or a diastolic blood pressure ≥ 90 mmHg,[12] or a history of antihypertensive treatment. Body mass index was calculated as body weight (kg) divided by the square of height (m).

Nephropathy was defined as either the presence of a glomerular filtration rate (GFR) < 60 mL/min/1.73 m^2, or the presence of UAE ≥ 30 mg/day independently of the GFR. GFR was estimated from the simplified equation of the MDRD study.[23]

To estimate the proportion of patients meeting clinical practice recommendations, the achieved level of variables evaluated in this study was classified according to statements of the National Kidney Foundation-K/DOQI Guidelines,[8] the American Diabetes Association,[9] the International Diabetes Federation,[10,11] the Joint National Committee 7 report,[12] and the Executive Summary of the NCEP-ATPIII.[13]

Blood pressure was considered at good level when < 130/80 mmHg.[8,9,12] A body mass index < 25 Kg/m^2 was considered as adequate,[9] and waist circumference at risk was defined as > 102 cm in men and > 88 cm in women.[13] Regarding to metabolic variables, adequate level was considered when plasma glucose was < 110 mg/dL,[10,11] total cholesterol < 185 mg/dL,[10,11] and triglycerides < 150 mg/dL.[9-11,13] The use of angiotensin converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) is recommended in diabetics,[8,9,12] as well as the use of aspirin at cardioprotective dose and stop smoking.[8,9] In patients with already established renal damage is necessary a more strict control of risk factors. At the present time, clinical practice recommendations consider only UAE as renal damage; however, a better approach to determine renal disease is considering both UAE and GFR.[8] Therefore, a subsequent analysis considering the presence of nephropathy (as defined previously) was performed.

Statistical analysis

Data are shown as mean ± standard deviation, median (percentiles 25-75%) or percentages as appropriate. Comparisons between groups were made by independent samples *Student t* test and χ^2. A $p < 0.05$ value was accepted as significant, but preferentially the exact value is shown.

RESULTS

Seven hundred thirty-five patients were included in the study. In the sample as a whole, adequate levels were observed in only 13% of patients in case of fasting glucose, 45% of blood pressure, 71% of UAE, 34% of fasting cholesterol and 28% of fasting triglycerides. Figure 1 shows the percentage of patients achieving clinical recommendations in the whole sample. Older patients had a higher proportion of subjects meeting recommendations for glucose and triglycerides levels, whereas younger patients met recommendations more frequently in the case of blood pressure and UAE. Women met clinical recommendations for UAE significantly more frequently than men. Patients with the highest educational level achieved good blood pressure levels more frequently, but patients with lower education had better glucose levels. Patients with longer duration of diabetes met recommendations less frequently for blood pressure and UAE; however, patients with less than five years and those with more than 15 years of diabetes tended to have higher percentage of good glucose levels than the others. Smokers met clinical recommendation for UAE less frequently than non-smokers (marginally), and obese patients had adequate levels of blood pressure and triglycerides less frequently than non-obese patients.

In addition, diagnosis of nephropathy was established in 305 (41%) patients; as isolated finding, microalbuminuria (30-300 mg/day) was observed in 19% and macroalbuminuria (> 300 mg/day) in 10% of population. Patients with nephropathy were older, had longer duration of DM2, and higher fre-

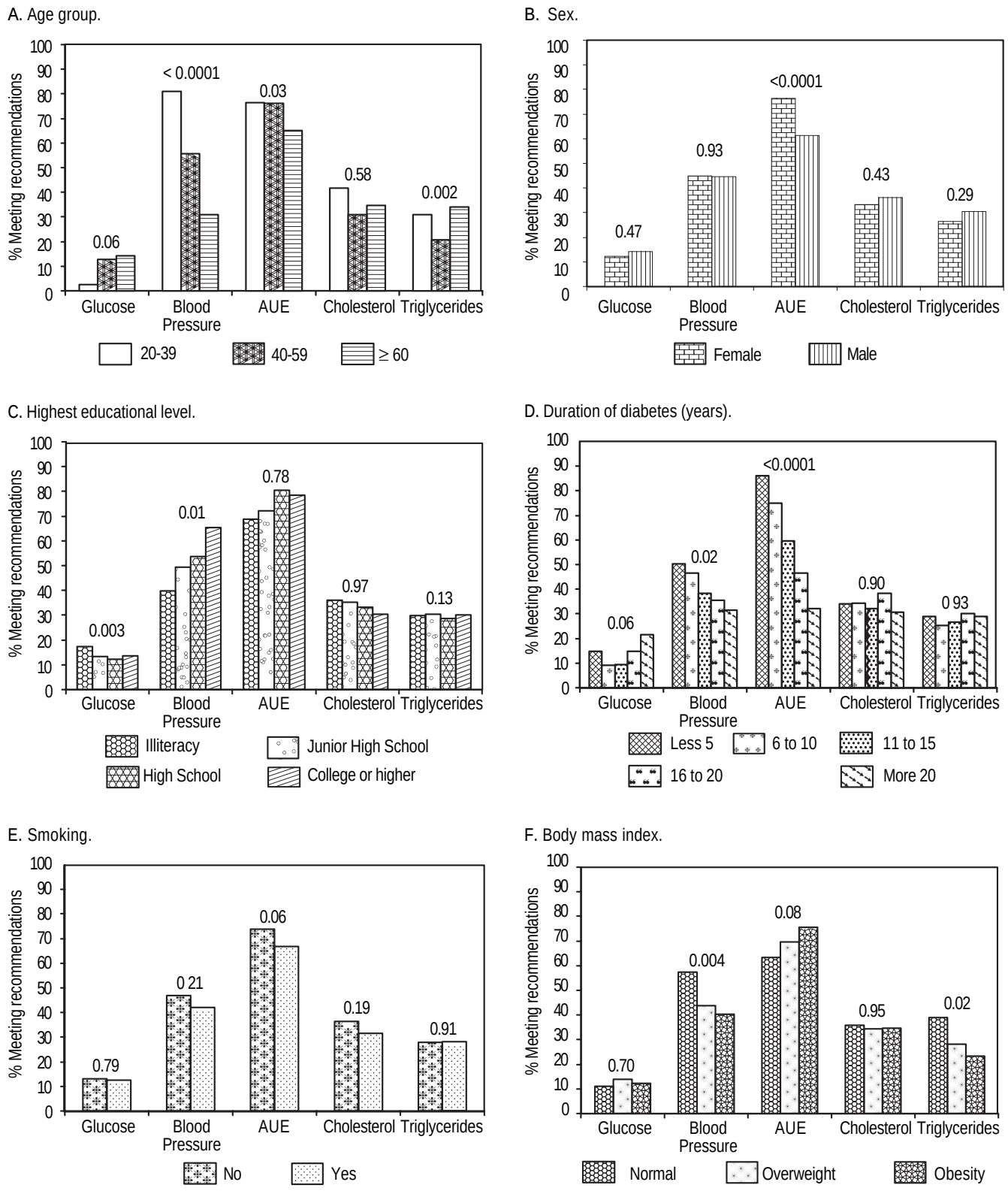

Figure 1. Percentage of achievement of clinical practice recommendations in the whole sample of patients [fasting glucose < 110 mg/dL, blood pressure < 130/80 mmHg, urinary albumin excretion (UAE) < 30 mg/day, fasting cholesterol < 185 mg/dL, fasting triglycerides < 150 mg/dL] by: A. Age group. B. Sex. C. Highest educational level. D. Duration of diabetes (years). E. Smoking. F. Body mass index.

Table 1. Comparison of demographic data according to the presence of nephropathy.

Variable	No Nephropathy	Nephropathy	*p*
Number (%)	430 (59%)	305 (41%)	
Age (years)	57 ± 11	62 ± 11	< 0.0001
Male Sex, N (%)	151 (35%)	129 (42%)	0.04
Smoking, N (%)	183 (43%)	139 (46%)	0.43
Alcoholism, N (%)	117 (27%)	89 (29%)	0.55
Illiteracy, N (%)	63 (15%)	65 (21%)	0.22
Duration of diabetes (years)	7.5 ± 6	12 ± 8	< 0.0001
Hypertension, N (%)	196 (46%)	189 (62%)	< 0.0001
Duration of hypertension (years)	8 ± 8	9 ± 8	0.24
Cardiovascular disease, N (%)	37 (9%)	63 (21%)	< 0.0001
Cerebrovascular disease, N (%)	12 (3%)	20 (7%)	0.01
Neuropathy, N (%)	78 (18%)	126 (41%)	< 0.0001
Retinopathy, N (%)	52 (12%)	117 (38%)	< 0.0001

Table 2. Comparison of clinical and biochemical data according to the presence of nephropathy.

Variable	No Nephropathy	Nephropathy	*p*
Systolic blood pressure (mmHg)	128 ± 20	133 ± 22	0.02
Diastolic blood pressure (mmHg)	75 ± 10	76 ± 11	0.60
Body mass index (%)			
< 25 kg/m^2	16%	20%	0.13
25-30 kg/m^2	43%	42%	0.88
> 30 kg/m^2	41%	38%	0.30
Waist Circumference (cm)			
Men	98 ± 10	100 ± 9	0.33
Women	94 ± 12	97 ± 14	0.10
Glucose (mg/dL)	179 ± 66	183 ± 70	0.33
Total Cholesterol (mg/dL)	202 (106-397)	208 (108-385)	0.31
Triglycerides (mg/dL)	242 (70-1,455)	221 (74-1,335)	0.05
Creatinine (mg/dL)	0.75 ± 0.16	1.0 ± 0.30	< 0.0001
Albuminuria (mg/day)	11 (2-26)	437 (2-7096)	< 0.0001
GFR (mL/min/1.73 m^2)	94.8 ± 24.2	65.2 ± 25.5	< 0.0001

GFR: glomerular filtration rate.

quency of male sex, hypertension, cardio and cerebrovascular disease, neuropathy and retinopathy, compared to patients without nephropathy (Table 1). No differences between groups were observed regarding other demographical variables; however, a high frequency of some risk factors for CKD and cardiovascular disease (such as smoking, alcoholism, and illiteracy) was observed in the studied sample.

Table 2 shows clinical and biochemical data according to the presence of nephropathy. Patients with nephropathy had higher systolic blood pressure than patients without nephropathy but no differences of diastolic blood pressure, body mass index and waist circumference were observed between groups. Additionally, serum triglycerides were significantly lower in patients with nephropathy than in those without nephropathy, but fasting glucose and total cholesterol were not different. However, levels of these three latter biochemical variables were high.

Patients with nephropathy used significantly more antihypertensive drugs and insulin than patients without nephropathy (Table 3). The use of statins and non-steroidal anti-inflammatory drugs (other than aspirin) was low, and no differences were observed between groups.

Table 4 shows the percentage of patients who met clinical practice recommendations according to the presence of nephropathy. A low proportion of patients in this sample met clinical practice recommendations, and this was observed independently of the

Table 3. Comparison of treatment according to presence of nephropathy.

Variable	No Nephropathy (%)	Nephropathy (%)	*p*
Antihypertensive number, (%)			
1 antihypertensive	36	43	0.11
≥ 2 antihypertensives	10	18	0.004
Antihypertensive type, N (%)*			
Diuretics, N (%)	5	9	0.23
Calcium channel blockers, N (%)	3	3	0.74
Beta-blockers, N (%)	5	10	0.01
Antidiabetic treatment			
Only diet, N (%)	21	19	0.58
Insulin, N (%)	7	11	0.05
Oral hypoglucemiants, N (%)			
1 drug	52	50	0.60
≥ 2 drugs	22	26	0.43
Insulin+oral hypoglucemiants	5	7	0.38
Statins	17	14	0.23
NSAIDs (other than aspirin), N (%)	17	14	0.23

*Other than ACEIs or ARBs. NSAIDs: non-steroidal anti-inflammatory drugs.

Table 4. Percentage of patients who meet clinical practice recommendations according to the presence of nephropathy.

Variable, N (%)	No Nephropathy (%)	Nephropathy (%)	*p*
Blood Pressure †,‡,£			
Systolic < 130 mmHg	49	40	0.03
Diastolic < 80 mmHg	46	43	0.36
Body mass index < 25 Kg/m^2†	16	20	0.13
Waist circumference ¶			
Male ≤ 102 cm	69	65	0.61
Female ≤ 88 cm	32	30	0.70
Fasting plasma glucose < 110 mg/dL *	13	13	0.96
Total cholesterol < 185 mg/dL *	36	33	0.25
Triglycerides < 150 mg/dL *,¶,†	29	26	0.42
Use of ACEIs †,‡,£	38	49	0.004
Use of ARBs †,‡,£	1	4	0.05
Use of Aspirin (100 mg/day) †,£	5	7	0.39
No Smoking †,£	47	54	0.43

* According to references 10,11. ¶ according to reference 13. † according to reference 9. ‡ according to reference 12. £ according to reference 8.

presence of nephropathy. Adequate levels of systolic blood pressure were more frequently observed in patients without nephropathy than in those with nephropathy, whereas diastolic blood pressure levels were not different; however, less than a half of patients in both groups showed adequate levels of systolic or diastolic blood pressure. Body mass index was normal in only one fifth (or less) of patients in both groups, and waist circumference (according to the ATPIII criteria[13]) was acceptable in only two thirds of men and one third of women. If the IDF criteria[10] for waist circumference are considered, a lower proportion of patients with and without nephropathy achieved adequate levels, both in the case of men (< 94 cm): 36% and 27%, respectively, p = 0.19; and women (< 80 cm): 7% and 6%, respectively, p = 0.73. In addition, only 13% of patients in both groups achieved good levels of fasting plasma glucose, and less than a third displayed adequate levels of total cholesterol and triglycerides. A higher proportion of patients with nephropathy received angiotensin converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) compared with those without nephropathy; however, even in patients with nephropathy, the use of these drugs was lower than 50%. Family physicians were unaware of

their patients' renal disease, and they seemed to use these drugs mainly as antihypertensive treatment (93% of patients using ACEIs or ARBs had hypertension). GFR was not different between patients receiving or not these drugs [57.3 (48-72) *vs.* 58.1 (50-78) mL/min/1.73m^2, respectively, $p = 0.10$], whereas AUE was significantly higher in patients with ACEIs/ARBs treatment [133 (33-601) *vs.* 72.5 (35-200) mg/day, respectively, $p = 0.001$]. Finally, in both groups a small proportion of patients used aspirin (at cardiopropective dose), and approximately a half were non-smokers.

DISCUSSION

Findings of this study showed that achievement of clinical practice recommendations is poor in DM2 patients of primary health-care units of our setting. Although the response to actions proposed by clinical practice recommendations depends on several issues related to patients, physicians and environment, failing to reach such goals seems to be universally related with poor prognosis in this kind of patients.[8-20] Ignoring the diagnosis of renal damage by physicians in this study was extremely worrying, as nephroprotection measures were not specifically addressed in these patients. As physicians were unaware of the renal function status, the management (suboptimal) was performed disregarding of the presence of normal renal function or nephropathy. This matter is doubly concerning as poorly controlled diabetic patients without nephropathy could eventually develop renal disease.

Clinical and biochemical characteristics of patients in this study are similar to other series reported in diabetics with social security coverage of our setting[24] and nation-wide,[25] and to the reported in other non-covered Mexican population.[26] Other longitudinal studies[27,28] have shown a poor control of metabolic and lifestyle habits in Mexican diabetic patients, and that (as in the case of the present study) the presence of risk factors for renal damage progression (including modifiable factors such as smoking, alcoholism, obesity, illiteracy and hypertension) is remarkably frequent. Therefore, although not directly measured in this study, it is possible that a long-term bad control that these subjects may have experienced, and the high frequency of all these risk factors, may influence on the high rate of chronic diabetic complications (including nephropathy) observed in this study.

In the whole sample, the grade of achievement of clinical practice recommendations varied between the different evaluated variables. Inadequate levels of glucose were particularly remarkable. The NHANES in United States population, using A1c hemoglobin as a measure of glycemic control, showed that about 50% of diabetics did not achieve recommendations, and this seemed to be worst in Mexican-Americans.[20] In our setting, the proportion of subjects not achieving fasting glucose clinical practice recommendations was almost 90% (we used fasting serum glucose because of economical reasons); this extremely high frequency of bad glucose control is supported by findings reported in other Mexican series.[26-28] Serum levels of glucose were better in older and illiterate patients, a finding that is not clearly explained, although a better diet compliance cannot definitely discarded. In a similar way, it was notable that serum glucose displayed better levels in patients with less than five, or more than 15 years of duration of the disease; this may reflect, on the one hand, a better pancreatic reserve during the first years of the disease, and on the other hand, probably the survivors' effect (a term applied to those subjects that having the best conditions achieved a longer survival).[29]

Similar to glucose, lipids had inadequate levels in a high proportion of our patients, which is in agreement with the results of other Mexican studies.[27,28,30] Elderly seemed to have better triglycerides levels, whereas obese patients displayed the broadly known inappropriate levels of these serum lipids.[31]

Adequate levels of blood pressure were found in less than a half of patients, whereas UAE was acceptable in only a third of them; similar findings have been reported in other series.[20,32] Higher educational level, related to socioeconomic and cultural aspects,[33] and health outcome,[34] was associated with better blood pressure levels, whereas obese subjects showed the worst control, as frequently described.[31] Elderly and patients with longer duration of diabetes had the worse UAE and blood pressure levels, which could reflect the inexorable course of the disease.[35] In addition, male sex and smoking were associated with inadequate levels of UAE as it has been reported.[36,37] In spite of all the previous data, a low use of cardio- and nephroprotective measures (such as the use of ACEIs, ARBs, aspirin, statins and smoking cessation) was observed in this sample of patients; this was particularly striking but similar to the reported in other Mexican[3,27,28] and non-Mexican studies.[18,19]

Obesity is a problem with alarming increase in our country.[38] In this regard, only a fifth of patients had a level of body mass index as recommended, evidencing that obesity and overweight are as serious

problems in our diabetic patients as they are in the whole nation population.[38] Moreover, abdominal distribution of fat is an acknowledged cardiovascular risk factor;[13,39] in our setting, using the ATPIII criteria,[13] the proportion of subjects with waist circumference at high risk was particularly important (remarkably in women). According to the IDF criteria, Mexican subjects may be more appropriately compared with other anthropologically related populations such as Orientals.[40] Waist circumference reference values of Oriental population are stricter than those of the American one; in consequence, a higher proportion of subjects at risk was found when the IDF criteria were used.

Patients with already established renal damage need a more strict control of risk factors; however, it seems that a minority of diabetics with renal disease receives appropriate treatment.[3,16-21] Very limited information of meeting clinical practice recommendations is available in our country, and no information has been published world-wide using a definition of nephropathy as the one used in this study; therefore, analysis of the data, considering the presence of nephropathy, are very interesting. As could be expected for pathophysiological reasons,[41] patients with nephropathy were significantly older, had longer duration of DM2, and higher frequency of hypertension and chronic complications such as cardio-and cerebrovascular disease, neuropathy and retinopathy, than patients without nephropathy. Probably because of their higher systolic blood pressure, patients with renal disease were more frequently treated with ≥ 2 antihypertensive drugs, and interestingly, they used more frequently ACEIs and ARBs. As none of our patients had a previous diagnosis of renal disease, family physicians most probably had prescribed ACEIs and ARBs as antihypertensive drugs (93% of patients receiving this medication was hypertensive). Even though these drugs were not specifically prescribed as nephroprotective, they may have played a beneficial role, as patients who were on them (mostly with hypertension) had a similar GFR than patients who were not receiving them (without hypertension). On the other hand, patients treated with these drugs had significantly higher UAE; because of the cross-sectional design of this study, however, it cannot be identified whether these patients had actually a reduction from their previous protein excretion value with the use of these drugs.

In principle, it was disturbing that a large proportion of patients at high risk for developing CKD as ours had no renal disease diagnosed despite they were attending primary health-care units. Predictably associated with this finding, many risk factors were not specifically addressed. It is particularly disturbing that all the evaluated goals for clinical practice recommendations were achieved in a very low proportion in both patients with and without nephropathy. If this scenario is prolonged for a long-time, the probability is high for these risk factors to participate in the onset and/or progression of renal damage.

Several strategies could be implemented to improve management of diabetic patients at the primary health-care, including adequate training for physicians to improve their clinical attitude in diagnosing and treating early nephropathy,[28] and adequate timing for referring patients to the nephrologist.[27] However, other strategies devoted to modify lifestyle and dietary habits should be explored, as the latter seems to be particularly difficult to improve for the medical team.[3,27,28]

Cross-sectional studies, like ours, have well known limitations, as for only one measurement is performed at a given moment, and this precludes the establishment of causality. On the other hand, this kind of studies is very useful, and may serve as the basis for further prospective analysis, helping to take adequate health policies. Thus, findings showed in the present study display the alarming magnitude of the problem, and should be considered in the institution of programs and solutions to stop the CKD pandemic at the primary health-care setting.

In conclusion, recommended goals for adequate control of DM2 patients attending primary health-care units in our setting are rarely achieved, and this is independent of the presence of nephropathy. The latter finding is highly disturbing, as poor clinical and metabolic control may eventually cause that patients without nephropathy develop renal damage, and those subjects already with renal disease progress to renal insufficiency. Several risk factors, some of them modifiable, are frequently present in this population, and deserve a higher attention to eradicate or decrease them as possible.

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COMPETING INTERESTS

All the authors declare none competing interests.

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