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Review Article

Prevalence of diabetic nephropathy among Type 2 diabetic patients in some of the Arab countries

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ABSTRACT

Type 2 diabetes mellitus (DM) is a public health concern worldwide and an important cause of morbidity and mortality. Type 2 DM is associated with microvascular and macrovascular complications. Diabetic nephropathy (DN), which is characterized by proteinuria, is one of the most serious long-term microvascular complications of DM. The proportion of DN is increasing worldwide. DN is the leading cause of chronic kidney diseases and end-stage renal disease, which constitutes the major workload of dialysis centers worldwide. Microalbuminuria (MA) is the earliest sign of DN, so the early detection of MA and early control of diabetes retards the progression of DN.

Keywords: Diabetic nephropathy, microalbuminuria, Type 2 diabetes mellitus

Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from defect in insulin secretion, insulin action or both. It is an important cause of morbidity and mortality worldwide. Globally, in 2014, there were 422 million adults having diabetes.[1]

DN is a public health concern of increasing proportions and reasons for a significant reduction in life expectancy of diabetic patients.[2] Without any intervention in Type 2 diabetic patients, 20-40% with microalbuminuria (MA) progress to manifested nephropathy after 20 years from the onset of diabetes; approximately 20% develop end-stage renal disease (ESRD).[3] DN is a microvascular complication of DM and is known to be the leading cause of ESRD worldwide.[4] The risk of developing diabetic nephropathy (DN) starts with albuminuria, progressing from MA to macroalbuminuria. MA is considered to be an early marker of DN and predictor for cardiovascular disease.[5] The progression of DN from proteinuria to renal failure is irreversible.[6] Therefore, detection of MA as early as possible in the course of the disease is important. The American Diabetes Association (ADA) recommends that all Type 2 diabetic patients should do annual MA urine test, starting at the time of diagnosis.[7] Screening for MA can be performed using quantitative methods, including:

1. Measurement of albumin to creatinine ratio in a random urine sample
2. A 24-h urine collection, which allows the simultaneous measurement of creatinine clearance
3. Timed overnight urine collection for protein, or using semi-quantitative reagent dipsticks specifically designed with detection limits suitable for identifying MA, such as the Micral dipsticks[8]
4. A 24-h urine collection, which allows the simultaneous measurement of creatinine clearance
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According to the ADA, when using the random collection technique, normal albumin excretion should be defined as <30 mcg/mg of creatinine; microalbuminuria 30-299 mcg/mg of creatinine, and macroalbuminuria is >300 mcg/mg of creatinine in two of the three tests within 3-6 months. In the 24-h collection technique, albumin excretion <30 mg/24 h is considered normal, 30-299 mg/24 h indicates microalbuminuria, and 300 mg or higher indicates macroalbuminuria. When using the timed collection technique, normal albumin excretion is defined as <20 mcg/min, microalbuminuria is defined as 20-199 mcg/min, and macroalbuminuria is defined as >200 mcg/min.[9]

This paper is aimed at reviewing published studies that discussed the presence of DN among Type 2 diabetic patients in some of the Arab countries.

Prevalence of DN among Type 2 Diabetic Patients in Some of the Arab Countries

In Saudi Arabia, the rate of MA among Type 2 diabetic patients attending the diabetic clinic of King Abdulaziz University Hospital during the period of September 2004 to April 2005

was 45.6%.[10] About 54.3% of patients with Type 2 DM attending a primary care center in Abha city, southern Saudi Arabia, had proteinuria.[11] A cross-sectional study, where 54.670 Saudi Type 2 diabetic patients were selected from Saudi National Diabetes Registry found that the prevalence of DN was 10.8%, divided into 1.2% MA, 8.1% macroalbuminuria, and 1.5% ESRD.[12]

In Bahrain, the prevalence of MA and macroalbuminuria among Type 2 diabetic patients were 22% and 5.8%, respectively. These data were collected from nine primary health-care centers in 2006.[13] Overall, between June 2006 and May 2007 in Kuwait, a result taken from patients with Type 2 DM in El-Fahaheel primary health-care center shows that the prevalence of MA was 58.2%.[14] In another setting of Kuwait, the prevalence rate of proteinuria among Type 2 diabetic patients at Al-Sabah Hospital was found to be 43.5%, the prevalence of MA and macroalbuminuria was 27.3%, and 16.2%, respectively.[15]

During 2003/2004, among people with DM in Al-Ain district, United Arab Emirates, MA was present in 61.2% of the sample population.[16] In Oman, the prevalence of patients who had MA among Type 2 diabetic patients attending an outpatient diabetic clinic at Sultan Qaboos University Hospital between 2002 and 2003 was 27%.[17] In another study in Oman, 42.5% of the studied population was found to have DN.[18] In Yemen, a cross-sectional study of 500 Type 2 diabetic patients shows the prevalence of MA was 21.2% and macroalbuminuria was 12.4%.[19] During 2013, a study conducted on Type 2 diabetic patients attending the diabetic center of Baghdad, capital city of Iraq, shows the prevalence of MA was 16.1%.[20]

In Sudan, the prevalence of MA among Type 2 diabetic patients in Elmusbah Medical Center-Omdurman was 44%.[21] During 2011/2012, among Type 2 diabetic patients in Menoufia governorate, Egypt; the overall prevalence of MA and macroalbuminuria was 34.2% and 12.8%, respectively.[22] In Tunisia, the prevalence of MA among Type 2 diabetic patients who were followed up in two primary health-care centers was 23%.[23]

Discussion

The studies show an alarming high prevalence of albuminuria, In the United Kingdom Prospective Diabetes Study, the prevalence rate of nephropathy in Types 2 diabetic patients was 30.8%, while in Mexican Americans was 31%.[24] Moreover, studies conducted in Asian countries reported variability in the prevalence rate of MA ranging from 14.2% in Iran, 24.2% in Pakistan, to 36.3% in India. While, the prevalence of macroalbuminuria was 12.7% in Taiwan and 11.2% in Thailand.[25-27] The prevalence of MA in Europe countries was 26.9% in Hungary, while macroalbuminuria was 16% in Italy as well as Sweden and 9% in Germany.[28-31]

These variations in the prevalence rate of proteinuria can be attributed to differences in several factors such as; study design, source of study population, sample selection, race, age, sex structure of the study population, diagnostic criteria, as well as the methods of measurement of proteinuria and urine collection, diabetic duration, diabetic treatment, and presence of hypertension.

The Centers for Disease Control and Prevention recommended early detection of MA in diabetic patients. Fortunately, the

Table 1: Summary of the prevalence of diabetic nephropathy among type 2 diabetic patients in some of the Arab countries

Reference	Date of the study	Country	Prevalence of DN (%)
Afaf Al-Adsani[15]	2000-2005	Kuwait	Microalbuminuria 27.3 Macroalbuminuria 16.2
Al-Futaisi, *et al*.[17]	2002-2003	Oman	Microalbuminuria 27
Al-Maskari, *et al*.[16]	2003-2004	United Arab Emirates	Microalbuminuria 61.2
Al-Homrany and Abdelmoneim[11]	2004	Saudi Arabia	Proteinuria 54.3
Al-Shaikh[10]	2004-2005	Saudi Arabia	Microalbuminuria 45.6
Al-Salman, *et al*.[13]	2006	Bahrain	Microalbuminuria 22 Macroalbuminuria 5.8
Shebl and Atteia[14]	2006-2007	Kuwait	Microalbuminuria 58.2
Rahamtalla, *et al*.[21]	2008-2009	Sudan	Microalbuminuria 44
Alrawahi *et al*.[18]	2010-2011	Oman	Proteinuria 42.5
Bamashmoos and Ganem[19]	2011-2012	Yemen	Microalbuminuria 21.2 Macroalbuminuria 12.4
Farahat, *et al*.[22]	2011-2012	Egypt	Microalbuminuria 34.2 Macroalbuminuria 12.8
Al-Rubeaan, *et al*.[12]	2013	Saudi Arabia	Microalbuminuria 1.2 Macroalbuminuria 8.1
Ali and Al Lami[20]	2013	Iraq	Microalbuminuria 16.1
Afifa, *et al*.[23]	2013-2014	Tunisia	Microalbuminuria 23

early detection of MA and good control of diabetes delay the development of DN. The causal risk factors for MA are hypertension and poor glycemic control. Furthermore, the association between increased blood pressure and DN was recognized by most of the studies.[24,32,33]

The significant association of MA with positive family history of increased blood pressure is consistent with a study done by Keller *et al*., 1996, in Germany.[34] Similarly, the significant association with positive family history of DN is consistent with other studies that revealed a hereditary susceptibility contributing to the development of DN in diabetic patients.[35,36]

In addition, the role of dyslipidemia in the development of DN has been described in several studies. In the majority of the studies, cholesterol and triglyceride showed a positive correlation with the degree of albuminuria, while high-density lipoprotein-cholesterol was found to have negative correlation with it.[37,38] Furthermore, other studies had done in the Netherlands and China show the significant association between MA and waist-hip ratio.[39,40]

Conclusion

The prevalence of DN in Type 2 diabetic patients was found to be high, alarming the health workers and decision makers to face this problem by developing strategies for prevention, detection, and treatment of DN. Therefore, there is an urgent need for annual screening for MA that is recommended by the ADA for all patients with Type 2 DM, which is highly cost-effective. The presence of MA is an indication to the physician to take steps to prevent further renal damage by correction of risk factors, such as control of diabetes and hypertension.

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