Alexandria Journal of Medicine (2016) xxx, xxx–xxx

HOSTED BY

ELSEVIER

Alexandria University Faculty of Medicine

Alexandria Journal of Medicine

http://www.elsevier.com/locate/ajme

ORIGINAL ARTICLE

Reduced glomerular filtration rate as a predictor of coronary artery disease events in elderly patients

Tarek A. Ghonemy *, **Ebrahim M. Salim, Sameh A. Soliman, Hala M. Allam**

Internal Medicine Department, Nephrology Unit, Zagazig University Hospital, Egypt

Received 2 April 2016; revised 20 June 2016; accepted 21 June 2016

KEYWORDS

Coronary artery disease;
Glomerular filtration rate;
Elderly

Abstract *Background:* Chronic kidney disease is independently associated with cardiovascular disease (CVD) events in high-risk populations according to several studies. However, findings from community-based population studies are insufficient. We studied the relationship between estimated glomerular filtration rate (eGFR) and risk of coronary artery disease (CAD) events in patients attending Zagazig University Hospital, Sharqiya governorate, Egypt.

Methods: A total of 800 subjects aged ⩾60 years admitted to Internal Medicine Department or attended medicine outpatient clinic were included in this study. Careful history and full clinical examinations were done to assess the risk factors of CAD. Serum creatinine, lipid profile and serum glucose were measured. Estimated eGFR was evaluated by creatinine based MDRD formula. According to eGFR, patients were divided into 2 groups: group 1 with eGFR ⩾ 60 mL/min/1.73 m^2 and Group 2 with eGFR < 60 mL/min/1.73 m (between 40 and 60 mL/min/1.73 m).

Results: 410 patients were found to have eGFR ⩾ 60 mL/min/1.73 m^2, while 390 patients were found to have eGFR < 60 mL/min/1.73 m^2. eGFR was lower in patients with CAD (62 ± 13 mL/min/1.73 m^2) in comparison with patients without CAD (76 ± 11 mL/min/1.73 m^2) ($P \leqslant 0.001$). Older age, hypertension, Diabetes and Low HDL are highly significant risk factors for CAD in those patients (P 0.001).

Conclusions: Reduced eGFR is a significant risk factor for CAD events in older patients. Monitoring of eGFR may have a pivotal role in early detection and management of CAD in those types of patients.

1. Introduction

Chronic kidney disease (CKD) is considered a public health problem.[1] Also, it is a disease entity including mild to end-stage renal diseases due to any etiology.[2] Serum creatinine is generally thought to be a poor indicator of renal function. In contrast, glomerular filtration rate (GFR) is a more accurate measure of renal function.[2] Cardiovascular disease (CVD) is the main cause of mortality in chronic kidney disease patients.[3]

* Corresponding author at: Zagazig University, Zagazig University Hospital, Nephrology Unit, PO Box 44519, Egypt.
E-mail address: tarekghonemy@hotmail.com (T.A. Ghonemy).

Peer review under responsibility of Alexandria University Faculty of Medicine.

http://dx.doi.org/10.1016/j.ajme.2016.06.006

Previous clinical trials have shown that reduced glomerular filtration rate (GFR) is an independent risk factor for all-cause mortality as well as adverse CVD events, such as myocardial infarction and stroke,[4,5] and patients with a low level of GFR show increased exposure to CVD risk factors, such as diabetes, hypertension and dyslipidemia.[6,7]

Many studies have been restricted to study patients with estimated glomerular filtration rate (eGFR) below 60 mL/min/1.73 m^2 compared to above 60 mL/min/1.73 m.[8–12] However the effects of earlier stages of renal function deterioration on CAD outcomes have been less well studied particularly in the elderly.[13] Thus there is uncertainty as to whether mild renal dysfunction may have adverse cardiovascular effects independent of known risk factors in this population.

In the present study, we hypothesized that eGFR is related to risk of CAD in the general population so we investigated the relationship between reduced estimated GFR (eGFR) and risk of CAD events, either stable or unstable ACS (Acute coronary syndrome), in a community-based sample of elderly patients in Zagazig University Hospital in the period between 2013 and 2015.

2. Methods

2.1. Patient selection

We collected 800 patients attending the outpatient clinic of our hospital for follow-up of their comorbid diseases, during the period from March 2013 to June 2015 to be included in this prospective study.

Inclusion criteria: Patients were considered eligible for enrollment if they were over 60 years of age. Patients were divided into two groups according to eGFR: group 1 with eGFR $\geqslant$ 60 mL/min/1.73 m^2 and group 2 with eGFR between 40 and 60 mL/min/1.73 m^2 as shown in Table 1.

Exclusion criteria: Patients with malignant tumors, bedridden status, mental disorder, and heart and lung failure and patients with advanced chronic kidney disease were excluded from the study before inclusion. An informed written consent was obtained from each patient after full explanation of the study protocol. The study protocol was reviewed and approved by our Local Institutional Human Research Ethical Committee as it conforms to the ethical guidelines of the 1975 Declaration of Helsinki, as revised in 2002.

Table 1 Baseline characteristics of all study population.

Patient Characteristics	eGFR $\geqslant$ 60 (n = 410) (Group 1)	eGFR (40–60) n = (390) (Group 2)
Age	66 ± 6	69 ± 5
Gender M/F	200/210	341/49
Basal disease		
Angina pectoris (n = 223)	110	113
Old myocardial infarction (n = 168)	77	91
Ischemic cardiopathy (n = 70)	29	41
No CAD (n = 339)	194	145
Risk factor		
Hypertension	127	176
Diabetes mellitus	41	51
Dyslipidemia	180	203

2.2. Clinical and laboratory assessment

Using a pretested questionnaire, information was collected on demographic data, family history of premature CAD, medical history of CAD, drug history, and smoking status. Weight was measured with patients minimally clothed without shoes using digital scales. Height was measured in the standing position without shoes using tape meter while shoulders were in normal alignment. Waist circumference (WC) was measured at the umbilical level and that of the hip at the maximum level over light clothing using an un-stretched tape meter without any pressure to body surface, and BMI was calculated as weight (kg) divided by square of the height (m^2). After a 15-min rest in the sitting position, two measurements of BP were taken on the right arm using a standardized mercury sphygmomanometer and the mean of the two measurements was considered the participant's BP. A blood sample was drawn between 7 AM and 9 AM from all study participants after 12–14 h of overnight fasting. All the blood samples were sent to the laboratory on the day of blood collection. Plasma glucose was measured using an enzymatic colorimetric method with glucose oxidase. Fasting plasma glucose (FPG) measurement was performed for all participants and the standard 2-h post-challenge plasma glucose (2-h PCPG) test for those not taking glucose-lowering drugs. Total cholesterol (TC) was assayed using the enzymatic colorimetric method with cholesterol esterase and cholesterol oxidase. High-density lipoprotein cholesterol (HDL-C) was measured after precipitation of apolipoprotein B-containing lipoproteins with phosphotungstic acid. Triglycerides were assayed using enzymatic colorimetric assay with glycerol phosphate oxidase. Serum creatinine (Cr) levels were assayed by kinetic colorimetric Jaffe method. The sensitivity of the assay was 0.2 mg/dL (range, 18–1330 mmol/L [0.2–15 mg/dL]). GFR was estimated using the Quadratic GFR equation proposed by Rule and colleagues.[14] The estimated GFR calculated in mL/min/1.73 m^2 using the revised "175" Modification of Diet in Renal Disease (MDRD) study equation was: 175 (standardized serum creatinine (Scr) in mg/dL)$^{-1.154}$ × (Age)$^{-0.203}$ × 0.742 with creatinine values entered in mg/dL into the equation.[15]

According to the eGFR, we classified our patients into two groups: group 1 with eGFR $\geqslant$ 60 mL/min and group 2 with eGFR < 60 mL/min/1.73 m^2 (range between 40 and 60 mL/min).

2.3. Diagnosis of coronary artery disease

For the diagnosis of CAD events, we depended on the American Heart Association classification for cardiovascular events[16–18] in addition to pre-tested questionnaire, full medical history and full medical examination. Coronary heart disease (CHD) includes cases of definite myocardial infarction diagnosed by electrocardiography (ECG) and biomarkers (creatine phosphokinase-MB, lactate dehydrogenase, troponin), probable myocardial infarction (positive ECG findings plus cardiac

Please cite this article in press as: Ghonemy TA et al. Reduced glomerular filtration rate as a predictor of coronary artery disease events in elderly patients, *Alex J Med* (2016), http://dx.doi.org/10.1016/j.ajme.2016.06.006