

Research Letters

The prevalence of chronic kidney disease in a Flemish primary care morbidity register

SIR—Based on earlier research [1, 2], we know that the estimated glomerular filtration rate (eGFR) decreases with age, starting in the third decade, even in healthy, normotensive adults. The components of this decrease in eGFR that are due to normal ageing and those that are due to non-ageing-related damage, caused by diabetes, hypertension, atherosclerosis or glomerulonephritis, remain uncertain.

In this study, the data from a large Flemish general practice-based morbidity registry, called Intego, were used to obtain a clear view of the prevalence of chronic kidney disease (CKD) in primary care patients aged 50 and older as well as the prevalence of severe CKD (eGFR <30 ml/min)

Methods

Study design

Data were obtained from Intego, a Flemish general practice-based morbidity registration network at the Department of General Practice at the Catholic University of Leuven. Ninety GPs, all using the medical software program Medidoc®, are currently collaborating on the Intego project. These GPs work in 55 practices distributed throughout Flanders, the northern part of Belgium. GPs whose data were accepted for inclusion in the database were selected on the basis of their excellent registration skills.

The Intego GPs prospectively registered all new diagnoses, together with new drug prescriptions, laboratory test results and some background information (including sex and year of birth), using computer-generated keywords linked to codes. Using specially framed extraction software, new data were collected from the GPs' computers and entered into a central database. Registered data were continuously updated and historically accumulated for each patient.

From this database, we selected all patients evaluated between 1994 and 2008 for whom at least two serum creatinine measurements were available within 5 years and who were 50 years or older at the time of at least one of these creatinine measurements. For these patients, date of birth, gender, all serum creatinine measurements and the exact date of these measurements were extracted. If there

were more than two creatinine measurements, the first two were used.

Ethical considerations

Before sending the data to the central database in Leuven, patient identification information was coded in each general practice using a one-way algorithm. As a result, only the registering GP was able to find out which patient matched a certain code. According to the national privacy law; however, patients were informed about the ongoing registration through a poster on the wall in the waiting room of the registering GP. The Intego procedures were approved by the ethical review board of the Medical School of the Catholic University of Leuven under N° ML1723.

Calculations and definitions

The eGFR was calculated with the MDRD equation [3] ($\text{GFR (ml/min/1.73 m}^2\text{)} = 186 \times (\text{S}_{\text{cr}})^{-1.154} \times (\text{Age})^{-0.203} \times (0.742 \text{ if female}) \times (1.212 \text{ if black})$). We used the classification system of the American Kidney Foundation to classify the patients: eGFR between 45 and 60 ml/min/1.73 m² = stage 3A, eGFR between 30 and 45 ml/min/1.73 m² = stage 3B, eGFR between 15 and 30 ml/min/1.73 m² = stage 4 and eGFR <15 ml/min/1.73 m² = stage 5. Patients with an eGFR >60 ml/min/1.73 m² with signs of kidney damage (stage 1 or 2 CKD) and without signs of kidney damage (no CKD) were analysed as one group.

Statistical analyses

Group analyses of the prevalence of CKD were performed for males and females. All analyses and the construction of the figures were performed using SPSS version 16.0 (SPSS, Inc., Chicago, IL, USA).

Results

Data on 34,668 patients were available. The data for 26 patients were deleted due to impossibly high or impossibly low creatinine values. The final population consisted of 34,642 patients, of whom 18,644 (54%) were women. The mean age of the population was 69 years (males 68 and females 70 years), and the standard deviation was 11.3 years. The mean time between the two creatinine measurements was 1.02 years (0.99 years for males and 1.05 years for females). In total, 77% of the patients had an eGFR >60 ml/min/1.73 m², 15% had stage 3A CKD,

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5.6% had stage 3B CKD and 2.3% had stage 4 + 5 CKD.

As shown in Table 1, the prevalence of CKD increases with age. At age 50–59, the prevalence of eGFR >60 ml/min/1.73 m² is 95% in males and 91% in females. For the group of patients aged 70–79, this prevalence was 76% in males and 67% in females. For patients aged 90 and older, this prevalence was 46 and 33%. The prevalence of stages 3A, 3B and 4 + 5 increases from 2.9%, 0.7 and 0.5% in males at age 50–59 years and 7%, 0.8 and 0.5% in females of the same age to 30%, 15 and 10% for males aged 90 and older and 30%, 26 and 12% for females of the same age-group.

Discussion

The prevalence of CKD in our group is comparable with the prevalence reported earlier for developed countries. Coresh *et al.* [4] (NHANES2 study, USA, patients aged 70 and over) reported the prevalence of an eGFR >60 ml/min/1.73 m² to be 38%; Cirillo *et al.* [5] (Italy, patients aged 75 and older) found a prevalence of 34% in males and 31% in females.

The large increase in the prevalence of CKD with ageing is mainly due to an increase in the number of patients with stage 3 CKD. Even in the group of patients older than 80 years, the number of patients with stages 4 and 5 CKD remained limited to 5–7%. Therefore, many of these patients have CKD but few have severe CKD. Until the age of 90, around half of all people exhibit a relatively good eGFR of 60 ml/min or more. This result shows that not all older kidneys have suffered large amounts of ageing-related damage. These findings suggest that there is no such thing as a general and large decline in the eGFR due to age-related kidney changes or damage. This theory

is supported by the data reported by the Baltimore longitudinal study on ageing [1], which found no decline in eGFR with ageing in one-third of the patients.

Owing to this high prevalence of mild and moderate CKD in patients 75 years and older, additional research should focus on how to identify the subgroup(s) of patients with a high chance of developing end-stage renal disease within this large group of patients aged 70 and older with mild or moderate CKD.

Strengths and limitations

The major strength of this study is the large cohort of unselected primary care consulting patients, who were selected out of a database, which has proved to be highly representative of the Flemish population [6]. This large cohort included a large subgroup of elderly patients (6,621 patients between 80 and 107 years old). Another strength is the use of the mean of two eGFRs, which lowers the chance of misclassification of the stages of CKD due to temporal illnesses, dehydration or biological or analytical variance. The selection designated by the inclusion criteria was checked. The yearly contact group (number of patients who contacted their GP at least once a year) included 36,395 patients aged 50 or older in 2008. Previous research [7] showed that approximately 90% of all persons living in Belgium aged 50 and older consult their GP at least once a year. Because we selected 34,642 patients out of the approximately 40,000 patients at these GP practices aged 50 years and older, the selection bias due to the inclusion criterion of ≥2 available serum creatinine measurements is limited.

This study also has three major weaknesses. First, no data related to proteinuria or albuminuria could be used in

Table 1. Prevalence of CKD in stages, for different age and sex groups

Age	Gender	Number of patients	Stage 0–2 (>60 ml/min) (%)	Stage 3A (45–60 ml/min) (%)	Stage 3B (30–45 ml/min) (%)	Stages 4 + 5 (<30 ml/min) (%)
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50–59	Male	4,496	95.1	2.9	0.7	0.5
	Female	4,731	91.7	7.0	0.8	0.5
60–69	Male	4,732	90.3	7.2	1.4	1.2
	Female	4,682	83.3	13.3	2.2	1.2
70–79	Male	4,402	75.5	16.5	5.3	2.8
	Female	4,978	66.6	22.6	7.5	3.3
80–89	Male	2,115	57.0	25.8	12.6	4.6
	Female	3,529	45.7	30.7	17.1	6.5
90+	Male	253	45.5	30.0	15.0	9.5
	Female	724	32.5	29.7	26.0	11.8
50+	Male	15,998	82.8	11.3	3.9	2.0
	Female	18,644	71.9	18.1	7.0	3.0
60+	Male	11,502	77.6	14.6	5.2	2.6
	Female	13,913	65.1	21.9	9.1	3.8
70+	Male	6,770	68.6	19.9	7.9	3.6
	Female	9,231	55.9	26.3	12.6	5.2
80+	Male	2,368	55.7	26.4	12.9	5.1
	Female	4,253	43.4	30.5	18.6	7.4

the analyses, because these data were only available for a limited number of patients. Using these limited albuminuria and proteinuria data would have caused substantial selection bias. Second, not all creatinine values were measured by the same laboratory or by the same creatinine assay due to the design of the database, which collects data from practices throughout Flanders. However, all Belgian laboratories are subject to quality control measures (http://www.iph.fgov.be/ClinBiol/bckb33/activities/external_quality/rapports/_down/klinische_chemie/2003/2_CHIMIE.pdf, 2009), which diminished the analytical differences among the laboratories. In the period between 1994 and 2008, most laboratories in Belgium used a kinetic Jaffe method without IDMS standardisation. Finally, we used the four variable MDRD equations for the estimation of the GFR. This equation is currently the most used equation but is originally [3] constructed in a population with renal diseases aged younger than 70 years and the number of studies validating this formula in patients aged 70 and over remains limited until now [8].

To conclude the prevalence of CKD in general practice increases with ageing but the prevalence of stages 4 and 5 CKD is limited, even in the oldest of the old. In the subgroup of patients aged 90 years and older more than 40% of the patients had an eGFR ≥ 60 ml/min. So a large group of patients show no decline or no clinically relevant decline in eGFR with ageing.

Key points

- The prevalence of CKD increases with age.
- Despite the decline of the mean eGFR with ageing almost half of the oldest old has an eGFR >60 ml/min.
- The prevalence of stages 4 and 5 CKD is limited, even in the oldest of the old.

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Extended-spectrum beta-lactamase-producing *Enterobacteriaceae*: unexpected low prevalence of carriage in elderly French residents

SIR—Extended-spectrum β -lactamases (ESBLs) are the major cause of resistance to cephalosporins. Since 2000, CTX-M enzymes have become the most prevalent, particularly in *Escherichia coli* [1, 2]. CTX-M-15-producing *E. coli* of the ST131 lineage has become endemic worldwide [3, 4]. The epidemiology of ESBL-producing *Enterobacteriaceae* (ESBLE) is complex, involving spread in the community, nosocomial acquisition and plasmid transfer between *Enterobacteriaceae*. It has been suggested that nursing homes (NHs) and long-term care facilities (LTCFs) may be significant to the epidemiology of ESBLE [5–8]. Elderly patients cumulate risk factors for carriage of multidrug-resistant (MDR) bacteria and residents have been recently shown to be reservoirs of ESBLE [9, 10]. A group of experts appointed by the French Ministry of Health to establish suggestions to tackle ESBLE recently recommended monitoring the