ORIGINAL ARTICLES

The Prevalence of Chronic Kidney Disease in Rheumatology Outpatients

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Abstract

Background

The introduction of routine reporting of estimated glomerular filtration rate coupled with a new definition of chronic kidney disease (CKD) has led to an unprecedented focus on kidney disease in many patient groups. In light of this, we performed an audit of patients attending the rheumatology clinics to assess the prevalence of CKD in this population.

Methods

Over a four week period, we reviewed the renal function of all patients attending the rheumatology clinics and day ward at our hospital (n=351). Renal function was assessed using the 4-variable MDRD formula. We then interviewed those patients with estimated glomerular filtration rate (eGFR) of 59 ml/min or lower.

Results

We found a prevalence rate of 18% for stage 3 CKD or lower in our audit population. Surprisingly, 60.3% of patients in this category were not aware of any problems with their kidneys (n=38).

Conclusions

The prevalence rate of 18% for stage 3 CKD or lower is significantly higher than the five per cent reported within the general population. As a result of this audit, we now plan to ensure that these patients undergo measurement of blood pressure, eGFR, and urinalysis on a six to twelve monthly basis.

Introduction

The introduction of routine reporting of estimated glomerular filtration rate (eGFR) and a new definition of chronic kidney disease (CKD) has led to an unprecedented focus on kidney disease in many patient groups. We performed an audit of patients attending the rheumatology clinics to assess the prevalence of CKD in this population.

Chronic kidney disease affects around 3-5% of the general population and is increasing in prevalence.[1,2] It is often a silent disease with few or no symptoms or clinical signs. It is therefore extremely important that high-risk individuals are monitored and have their kidney function assessed. This will allow treatment to be directed towards any modifiable risk factors that may be present and therefore prevent or ameliorate further decline in renal function.

There are several risk factors for the development of CKD.[3] The most common aetiological factors in the development of CKD are diabetes and hypertension. There is also a decline in GFR as we get older. Therefore, with an ageing population we would expect to see an increase in CKD in the coming years.

It is well documented that CKD is an important risk factor for the development of cardiovascular disease.[4,5,6] Many patients do not progress to end stage renal failure before cardiovascular disease manifests.[7] Indeed 40% of deaths in chronic kidney disease are due to cardiovascular complications.[8] There are also other manifestations of CKD such as anaemia, malnutrition and renal bone disease.[9,10]

In 2002 the National Kidney Foundation published guidance on the evaluation classification and stratification of Chronic Kidney Disease.[11] The classification of CKD is based on eGFR using the 4-variable MDRD formula.[12] Although the eGFR cut-offs are arbitrary in terms of renal function, they do correlate to clinical syndromes with cardiac risk increasing from stage three onwards.[13,14,15,16]

There are several methods of measuring renal function, which range from serum creatinine, or it's reciprocal to more formal measurements including radio-isotopes and radio-nuclides.[17] However, several formulae based on serum creatinine and patient demographic variables have become increasingly used.[18,12,19] Of these, formulae based on the Modification of Diet in Renal Disease (MDRD) study have become very popular as they are based on patients with established renal disease. They have been shown to be more accurate at lower levels of renal function than the Cockcroft-Gault formula which was based on normal healthy adult males and as a result, have largely replaced this formula.[20,21,22] Although the MDRD-based formulae have been validated in an ever-increasing number of patient groups, including the elderly and renal transplant recipients,[23,24,25] there are some limitations. Their application is limited in patients with normal or near-normal GFR defined as eGFR > 60 ml/min [26] and in certain ethnic subgroups.[27,28] It should also be stressed that these formulae are not valid in certain clinical settings such as acute renal failure, pregnancy, severe malnutrition, diseases of skeletal muscle, paraplegia or quadriplegia in children or when renal function is changing rapidly.[17]

Given the increased use of these formulae, as well as routine reporting of eGFR, we felt that it was important to investigate the prevalence of CKD within the patient population attending our rheumatology clinics.

Methods

Over four consecutive weeks we screened all patients (n=351) attending the rheumatology clinics at Gartnavel General Hospital. Using the 4-variable MDRD formula, we identified all those patients with an eGFR of 59 ml/min or lower. These patients were then interviewed. The 4-variable MDRD formula used to calculate eGFR is given below 12:

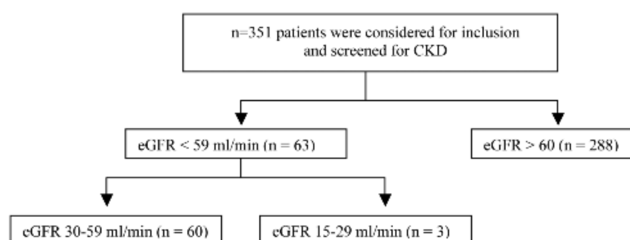
eGFR = 186.3* (SCr/88.4)$^{-1.154}$* age$^{-0.203}$* (0.742 if female) *(1.21 if black)

(where SCr = serum creatinine in µmol/L and age is expressed in years)

The patients that fitted the criteria of having stage three (eGFR 30-59 ml/min), stage four (eGFR 15-29 ml/min) and stage five CKD (eGFR <15 ml/min), were assessed in more detail. This gave us the opportunity to assess their awareness of their kidney impairment and to ask them about their past medical history and relevant drug history. Further medical information was obtained from the patients' medical notes and computerised medical records. As this was an audit, local ethical committee permission was not sought. However, we did explain fully the purpose of the audit and obtained written consent from each patient.

Comparison and analysis of the data were performed using Microsoft Excel for Windows 2003 (Microsoft Corp, Redmond, WA). Results are expressed as median (with inter-quartile ranges) unless otherwise stated

Figure 1: Details of How Patients Were Identified.



Results

Three hundred and fifty one patients attended our clinics during the four week audit period. Sixty three (18%) of those patients had an eGFR <60 ml/min and were therefore studied in more detail. (See Figure 1). Of those sixty three patients with CKD stage three or lower, 73% were female and the most prevalent condition was rheumatoid arthritis (60.3%). The median age of the patients was 72.0 years and the majority (93%, n=60) had stage three CKD, with a small group (7%, n=3) having stage four CKD. No patients had stage five CKD. Table I summarises the main results from the audit. Seventeen (5%) of the total study population of 351 had no serum creatinine recorded. 60 3% of the patients with stage three CKD or lower were not actually aware of any problems with their kidneys (n=38).

Table I: Overview of Audit Results

Overview of audit results.
Of the 351 patients screened 63 had eGFR < 59 ml/min
All results expressed as percentage and unless specified n = 63.

CKD Stage (n=351)	
Normal (eGFR >= 60 ml/min)*	77.2
CKD III (eGFR 30-59 ml/min)	17.1
CKD IV (eGFR 15-29 ml/min)	0.9
CKD V (eGFR <15 ml/min)	0
No record	4.8

Was patient aware of kidney disease?	
Yes	30.2
No	60.3
DNA	9.5

Drug History: Are they on the following?	Yes	No	NR
Antihypertensive therapy	47.6	47.6	4.8
HMG Co-A reductase inhibitor	39.7	57.1	3.2
Potentially nephrotoxic drugs	77.8	19.1	3.2

Proteinuria*	
No proteinuria or not documented	71.4
Proteinuria >= 0.1 g/day to < 0.5 g/day	25.4
Proteinuria >= 0.5 g/day	3.2

Clinical and laboratory variables	
Age	72.0 (66.0, 76.8)
eGFR	51.4 45.4, 55.9)
Systolic	142 (130, 156)
Diastolic	76 (68, 85)
Cholesterol	5.3 (4.4, 6.3)

Number of CV risk factors per patient**	
No risk factors	0
One risk factor	23.8
Two risk factors	47.6
Three risk factors	19.1
Four risk factors	9.5

Rheumatology Diagnosis	
Rheumatoid Arthritis	60.3
Psoriatic Arthritis	15.9
Osteoarthritis	14.3
Gout	4.8
Inflam. Polyarthritis	4.8

* patients with eGFR at or above 60ml/min/1.73m^2 should be regarded as normal unless there is evidence of kidney disease (persistent proteinuria and/or haematuria, microalbuminuria in diabetics, structural kidney disease such as adult polycystic kidney disease or reflux nephropathy)

** Hypertension, hyperlipidaemia, PMH of IHD, CKD, anaemia, obesity

In addition to quantifying the prevalence of CKD in this population, we also assessed a number of other relevant parameters, in terms of markers of renal function and risk factors of cardiovascular disease, in patients with Stage three to five CKD. The recent UK-wide consensus on CKD recommended that for patients with eGFR of 59 ml/min and lower, that anti-hypertensive treatment should be initiated when BP is >140/90, and that the therapeutic target should be <130/90.[29] We found that in our group with eGFR <59 ml/min 23 patients (36.5%) had a BP >140/90 and that 14 of these were on anti-hypertensives (60.9%). Thirty two (50.8%) of patients had BP >130/80 and of these 17 were on anti-hypertensive treatment (53.1%). When analysing the drug history it was interesting to note that 39.7% of patients were on a statin. The consensus currently suggests that treatment with a statin should be considered in patients with stage three CKD if the 10-year cardiovascular risk is greater than 20%. Using these criteria, we identified that 35 of the 63 patients (55.6%) had a risk greater than 20%. Only 13 of these 35 patients (37.1%) were on a statin.

It was also interesting, but not necessarily surprising, that 77.8% were on drugs such as sulfasalazine, methotrexate, gold and NSAIDs. Although rare, these drugs can be associated with both acute and chronic renal injury. Specifically, NSAIDs are associated with interstitial nephritis whereas gold therapy is classically associated with nephrotic syndrome. In terms of proteinuria, only 3.2% had significant proteinuria as defined as greater than 500 mg/litre. However, it must be stressed that a large proportion had no formal quantification of proteinuria performed (66.6%). It is routine practice at the rheumatology clinics to assess urinalysis on the first-ever visit and only send urine for quantification if positive. Thus, it may be reasonable to assume that only a small proportion of the patients had significant proteinuria at the start of their clinic 'career'. An assessment of the current prevalence was beyond the scope of the current audit but may be higher.

As discussed in the introduction, these patients have an increased cardiovascular risk. We therefore calculated how many cardiovascular risk factors they each had. The majority (77%) had a least two risk factors. Although it is difficult to quantify risk in this fashion, it does highlight the necessity of primary and secondary prevention. Two important cardiovascular and renal risk factors are hypertension and hypercholesterolaemia. We found that 56% were known to have hypertension and 44% had a total serum cholesterol >5 mmol/L.

Discussion

This audit demonstrates a high prevalence rate of stage three CKD or lower in patients attending the rheumatology clinics. The prevalence rate of 18% is far higher than the population average of 5%.[1,2] This is not entirely surprising when taking into consideration the fact that the majority of our patients have a chronic inflammatory disease and are much older then the general population with a median age of 72.0 years. It has been suggested from the NHANES III study that patients from the general population in the 60-69 age group will have a prevalence of stage three CKD of 7.1% whereas those patients over 70 years old will have a prevalence of 24.6%.[30] It is, therefore, highly likely that age is the most important factor in explaining the high prevalence of CKD rather than the underlying rheumatological condition. Nonetheless, it does highlight that rheumatology clinic patients, per se, represent a high-risk population which requires regular monitoring, and appropriate management in terms of their renal function and cardiovascular risk. One recent study came to a similar conclusion to our own and stated that between 50-60% of all patients with rheumatoid arthritis will have a degree of kidney disease.[31]

Another interesting and important point that arises from this audit is that 38 (60.3%) of the patients with stage three CKD or lower were not actually aware of any problems with their kidneys. This, however, does not necessarily imply that the underlying renal disease has been overlooked; it is merely an expression of their perception which nonetheless is interesting. Although some of these patients may not have been diagnosed it is reassuring that 61.3% had undergone an ultrasound of kidneys. This suggests that these patients had at least been identified as having CKD even if the patients themselves were not aware. It was not within the scope of this audit to ascertain how many patients' CKD status was already known by the GP.

Of the patients with stage three CKD or lower, the median age was 72.0 years (66.0, 76.8). 73.5% of the patients were female which seems reasonable given the fact that rheumatoid arthritis is a disease that tends to affect females more often.

There is mounting evidence that even mild renal dysfunction is a potent cardiovascular risk factor in the general population with cardiovascular disease accounting for 40% of all deaths in CKD.[8,20] It is therefore very important that cardiovascular risk factors in the early stages of CKD are identified and treated.[4] This was assessed during the audit by recording the most recent blood pressure, lipids and looking at the past medical history. It has been shown elsewhere that patients with rheumatoid arthritis have a higher cardiovascular disease[32] and one might speculate, that this increased cardiovascular burden derives from previously non-diagnosed CKD. This was beyond the scope of the current study but is an area that merits further investigation.

The importance of identifying CKD is underlined by the fact that aggressive targeting of cardiovascular risk factors with drugs such as statins, angiotensin converting enzyme (ACE) inhibitors and angiotensin 2 receptor antagonists has been shown to have a beneficial effect. For example, atorvastatin 10mg daily has been shown to reduce cardiovascular events by 40% in patients with CKD over five years.[8] ACE inhibitors and angiotensin 2 receptor antagonists have cardioprotective and renoproctive properties,[33] and have a potentially additional benefit when a patient has proteinuria. This includes diabetic[34,35] and non-diabetic causes of proteinuria.[36,37] The current audit identified a significant proportion of patients who might benefit from either increased treatment for their hypertension or hypercholesterolaemia.

The evolution of routine eGFR reporting is making it possible to easily identify these at risk patients and optimise their treatment, thus decreasing morbidity and mortality.

Conclusion

The audit has highlighted the high prevalence (18%) of CKD in rheumatology patients and the need for a high index of suspicion by medical staff caring for these patients. It is likely that a significant proportion of these patients had not been previously identified as having CKD. It is essential that these individuals are routinely assessed for kidney impairment using eGFR and urinalysis, not only to diagnose, but to direct treatment towards altering its progression and to target the increased cardiovascular burden that these patients suffer.

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