Anaemia in patients with Diabetes and Chronic Kidney Disease

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Background

Patients with diabetes and chronic kidney disease (CKD) are more likely to be anaemic and, anaemia is associated with increased cardiovascular risk. Treatment with erythropoietin (EPO) has been shown to improve quality of life but has not been shown to improve cardiovascular disease (CVD) outcomes. In contrast, overcorrection of anaemia is associated with worsened outcomes e.g. increased thrombosis.

We assessed the prevalence of anaemia [defined as an Hb < 110 g/L (2)] amongst patients with diabetes and CKD and looked at the correlation between anaemia, HbA1c and eGFR.

Validity of HbA1c as a measure of glycaemic control

Anaemia complicates the assessment of glycaemic control. Iron deficiency increases the HbA1c, but anaemia due to increased RBC turnover reduces the HbA1c. Furthermore, urea derived isocyanate results in carbamylated Hb which cannot be differentiated from glycated Hb. Dialysis on the other hand leads to a shortened RBC lifespan and a falsely low HbA1c.

Glycated fructosamine may be used as a surrogate marker of glycaemic control but this reflects a shorter period of time. This may also be affected by malnutrition or states of increased catabolism.

Causes of anaemia amongst patients with DM and CKD

1. Iron deficiency [due to inflammatory cytokines and reduced iron absorption and transport]
2. EPO deficiency [due to reduced renal mass]
3. EPO unresponsiveness [possibly due to systemic inflammation]
4. Vitamin deficiencies – B12 and folate
5. In nephrotic syndrome due to loss of transferrin and EPO in the urine.
6. ARB and ACEI directly inhibit the proerythropoietic effects of angiotensin II on red cell precursors.

As a consequence, anaemia tends to occur early in diabetic patients, even in the absence of overt nephropathy and it is more severe. Anaemia is also a significant adverse prognostic factor for cardiovascular disease and all-cause mortality in people with diabetes.

Consequences of anaemia

1. Reduced quality of life – malaise, fatigue, weakness
2. Possible progression of renal disease due to renal ischaemia due to low Hb and reduced oxygen delivery
3. Heart failure – which in turn may reduce renal blood flow

Early identification and correction of anaemia has been shown to reduce the rate of progression and even delay the onset of some microvascular complications as well as improve the quality of life of diabetic patients.

Methods

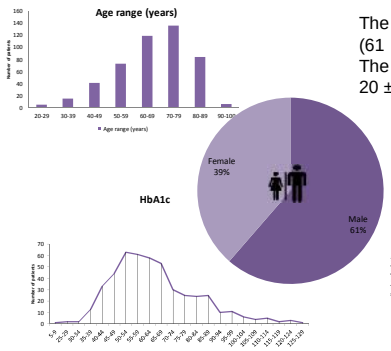
We looked at 509 patients aged above 19 years with either eGFR < 60 ml/min or with a raised urine albumin creatinine ratio. Data was analysed using Graphpad Prism 7. Pearson correlation was used to assess univariate associations between continuous variables

Results

98 % of patients had a full blood count measured and 19 % were anaemic (Hb < 110g/L). The mean Hb for all patients was 123.6 (± 16.8) g/L. Our data are in line with other studies which found that 1 in 5 patients with diabetes and CKD have anaemia (3).

Only 59 % of patients with identified anaemia had haematinics measured.

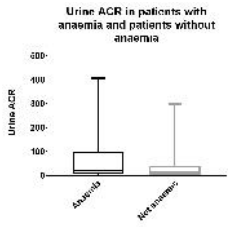
No patient had fructosamine measured as an alternate measure of glycaemic control.

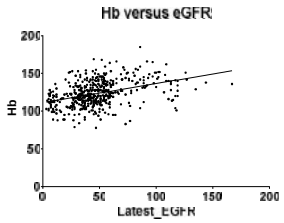


Patient Demographics

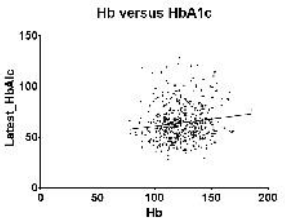
The majority of patients were male (61 %) with type 2 diabetes (82 %). The mean duration of diabetes was 20 ± 11 years.

Hb correlated positively with eGFR, Pearson coefficient 0.3988 (p <0.0001) and urine ACR was significantly higher in patients with anaemia compared to patients without anaemia (p < 0.01). This is to be expected as declining renal function causally contributes to anaemia.





Hb also correlated positively with HbA1c, Pearson coefficient 0.1344 (P < 0.0036). This may indicate a higher RBC turnover in our patients. However, we had insufficient data to investigate this relationship further.



Comparing patients with anaemia versus patients without, we did not find a significant difference between achievement of target BP, cholesterol or use of statins, ACEI or ARB.

- 41.3 % of patients with anaemia achieved a target BP of 130/80 versus 39.9 % without anaemia.
- 82 % of patients with anaemia were on lipid lowering drugs compared to 79 % without anaemia.
- 30.4 % versus 34.9 % did not have smoking status recorded (anaemic versus non-anaemic patients.

Conclusions

We found a 20 % prevalence of anaemia amongst our patients with diabetes and CKD. The management of cardiovascular risk factors was similar in patients with or without anaemia. It is likely that anaemia is not recognised as an independent risk factor for cardiovascular disease. Increased awareness of this risk factor should prompt further investigation and management of other cardiovascular risk factors.

In addition, only 59 % of our patients with anaemia had further investigations to determine the cause. Anaemia management is a core component of CKD management amongst renal physicians, however, our audit suggests that this may not be the case amongst diabetes physicians.

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