Limited knowledge of kidney disease in a survey of AusDiab study participants

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ABSTRACT

Objectives: To explore awareness of the causes of kidney disease and recollection of kidney function testing in a cohort of Australian adults.

Design, setting and participants: An interviewer-administered cross-sectional survey, conducted from October to December 2004 as a nested study within the 5-year follow-up phase of the Australian Diabetes, Obesity and Lifestyle Study (AusDiab); 852 subjects who attended a testing site in New South Wales were interviewed.

Main outcome measures: Responses to the questions "What sort of things do you think may lead to a person developing kidney disease?" and "Has a doctor or health care worker ever tested your kidney function, outside of the AusDiab study?"

Results: Respondents most commonly believed that kidney disease was caused by alcohol misuse or poor diet, with few identifying diabetes or high blood pressure. Awareness of risk factors was no greater in respondents identified as having chronic kidney disease (CKD). A third of respondents with CKD recalled having undergone a test of kidney function within the previous 2 years, while another third replied they had never had their kidney function tested. Of participants with previously diagnosed diabetes or treated hypertension, 54.1% and 32.0%, respectively, reported having their kidney function tested within the previous 2 years.

Conclusions: Knowledge of risk factors for kidney disease and recall of kidney function testing were both limited, even among subgroups of the cohort who were at greatest risk of CKD. Prevention efforts may benefit from public and patient education to improve recognition of risk factors for CKD.

MJA 2008; 188: 204–208

Chronic kidney disease (CKD) refers to progressive injury to the kidneys that results in gradual and irreversible loss of kidney function. Risk factors for onset and progression include diabetes/poor glycaemic control, hypertension, exposure to nephrotoxins and smoking.[1] The estimated proportion of Australian adults who have some degree of CKD is 16%,[2] of which a small minority will progress to end-stage kidney disease and the requirement for dialysis or a kidney transplant. For the majority, however, the outcome will be premature vascular mortality or a range of complications having a substantial impact on quality of life.[3-5]

Little is known about recognition and knowledge of CKD in the Australian community. Evidence of the benefits of detecting CKD in its earliest stages is growing, with interventions being effective in reducing morbidity and mortality.[6,7] However, poor awareness of risk factors for kidney disease in the general community is a likely barrier to early detection and prevention. Australian clinical practice guidelines recommend opportunistic testing by general practitioners for CKD in people with diabetes, hypertension, or a family history of kidney disease, and in Indigenous Australians.[8] Yet about one in two Australian adults with diabetes are undiagnosed,[9] and one in three with high blood pressure go untreated.[10] This suggests that many people at high risk of CKD or with existing asymptomatic CKD currently escape identification.

We conducted a cross-sectional survey of participants in the Australian Diabetes, Obesity and Lifestyle Study (AusDiab)[11] regarding their perceptions of the causes of kidney disease, and asking whether they recalled ever having had their kidney function tested. Our aim was to establish a picture of lay understanding of kidney disease in a cohort of adults taken from the general Australian community.

METHODS

Subjects

The AusDiab study, which commenced in 1999, is a longitudinal, nationally representative survey of diabetes mellitus and associated risk factors in Australians over 25 years of age. Selection methods[11] and baseline biomedical data collection methods have been reported elsewhere.[2,9,10] In 2004, a repeat survey was performed, with 60% (n = 6400) of the original cohort attending a testing site for follow-up data collection.[12] At baseline and at follow-up, those who attended the testing site underwent a physical examination that included blood pressure measurements, collection of blood samples after an overnight fast, collection of a random spot morning urine specimen, and a standard 75 g oral glucose tolerance test. Blood and urine samples were transferred to a central laboratory for analysis (baseline: Hitech Pathology, Melbourne, Vic; follow-up: Gribbles Pathology, Melbourne, Vic).[12]

Nested cross-sectional survey

As part of the follow-up survey, a nested, cross-sectional, interviewer-administered survey of participants in New South Wales was conducted. Of the 1458 participants from the baseline survey eligible for follow-up in NSW, 871 attended a testing site (a follow-up rate of 59.7%), and, of these, 852 (97.8%) agreed to be interviewed.

Respondents were asked "What sort of things do you think may lead to a person developing kidney disease?" as an open-ended question. They were not given response options or prompted, other than to remind them that their opinion was sought, that there were no "right" or "wrong" answers, and that they were free to give as many responses as they wished. Respondents were also asked "Has a doctor or health care worker ever tested your kidney function, outside of the AusDiab study?", with the prompt: "by testing your urine for blood or protein, performing a blood test for creatinine or by performing an imaging test (such as an ultrasound) of your kidneys".

It was hypothesised that participants known to have diabetes and those receiving blood pressure-lowering medication would be better able to identify the risk of kidney damage associated with diabetes and hypertension. As people with haematuria, proteinuria or elevated serum creatinine levels detected during the baseline survey had been

1 Baseline demographic characteristics and risk factors in the original and nested cohorts

	Overall ($n = 11\,247$)	NSW nested cohort ($n = 852$)
Male	44.9%	45.7%
Age (years)		
25–34	12.4%	7.5%
35–44	22.7%	24.5%
45–54	25.7%	29.1%
55–64	18.0%	20.5%
65–74	13.9%	12.8%
⩾ 75	7.2%	5.5%
Education		
Completed tertiary qualification	36.9%	46.7%
Completed secondary school	18.9%	17.6%
Did not complete secondary school	44.2%	35.7%
Residence outside a capital city	38.6%	44.7%
Main language not English	4.0%	3.8%
Chronic kidney disease	12.5%	12.0%
Previously diagnosed diabetes	5.0%	3.6%
Hypertension		
Untreated hypertension	16.8%	13.4%
Receiving blood pressure-lowering treatment	15.8%	15.8%
Previous cardiovascular event		
Heart attack	3.9%	3.3%
Stroke	2.6%	1.1%
Smoking status		
Current smoker	15.8%	10.1%
Ex-smoker	29.2%	25.6%

NSW = New South Wales. ◆

sent letters recommending follow-up of their test result with their GP, these participants were also hypothesised to have greater awareness of CKD and its risk factors.

Definitions

- CKD was defined as either urinary albumin to creatinine ratio ⩾ 30 mg/g, or estimated glomerular filtration rate < 60 mL/min/1.73m^2 (calculated according to the abbreviated Modification of Diet in Renal Disease Study formula).[13,14]
- Previously diagnosed diabetes was defined as an affirmative response to the question "Have you ever been told by a doctor or nurse that you have diabetes?".
- Treated hypertension was defined as an affirmative response to the question "Are you currently taking tablets for high blood pressure?".
- Untreated hypertension was defined as measured systolic blood pressure > 140 mmHg or diastolic blood pressure > 90 mmHg, excluding those who reported taking blood pressure-lowering medication.

Statistical methods

Data were analysed using Intercooled Stata software, version 8.0 for Windows (StataCorp, College Station, Tex, USA). Response distributions for the question "What sort of things do you think may lead to a person developing kidney disease?" were examined for the overall survey cohort and within subgroups (men, women, those with treated hypertension, those with previously diagnosed diabetes, and those with CKD at baseline).

The Stata MRTAB module (for computing one- and two-way tables of multiple responses) was used to calculate Pearson χ^2 statistics, assessing whether the proportion giving each response differed significantly between subgroups (men v women, treated hypertension v no hypertension/untreated hypertension, existing diabetes v no diabetes, CKD at baseline v no CKD at baseline).[15] *P* values for significance tests were adjusted for the fact that multiple tests were performed (Bonferroni method).[16]

To evaluate overall differences in response distributions by subgroup, logistic regression models were created in which responses formed the dependent variable, regressed against sex, treatment for hypertension (yes/no), diabetes status and CKD status. Likelihood ratio tests of the significance of interactions between subgroups and responses were performed. Random effects models were used to account for clustering of multiple responses on individuals.

Ethical approval

Both the overall and the nested studies were approved by the Ethics Committee of the International Diabetes Institute in Melbourne. Written informed consent was obtained from all participants at baseline and follow-up.

RESULTS

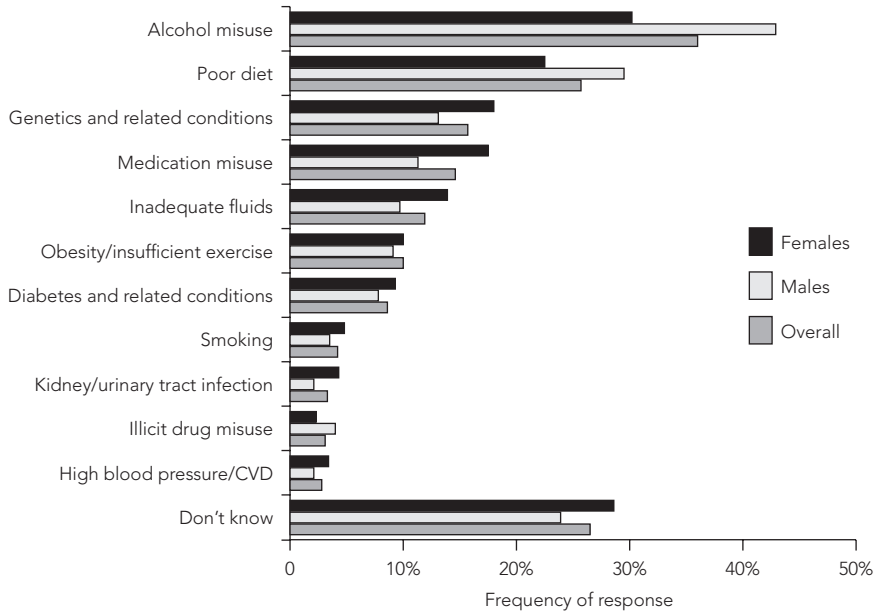
Population characteristics

The overall and nested cohorts resembled each other in terms of age and sex (Box 1). Baseline prevalence of CKD was also similar between the two cohorts. However, the nested follow-up cohort had slightly lower prevalences of previously diagnosed diabetes, prior stroke and untreated hypertension at baseline. The proportions of people who had completed tertiary education, lived outside a state capital city and were non-smokers were higher for the nested cohort.

Understanding of the causes of kidney disease (Box 2, Box 3)

The most common responses to the question "What sort of things do you think may lead to a person developing kidney disease?" were: alcohol misuse (36.0%), "don't know" (26.5%) and poor diet (25.7%). Only 2.8% of respondents identified hypertension and 8.6% identified diabetes/high blood sugar/excess dietary sugar as risk factors for kidney disease. A quarter of respondents (24.5%) identified only one possible risk factor, 24.4% named two factors, and 21.2% named three or more. Of the group who named three or more potential risk factors, the most common responses were still alcohol misuse (60.8%), poor diet (55.3%) and genetics/hereditary conditions/birth defects

2 Frequency of the most popular responses to the question "What sort of things do you think may lead to a person developing kidney disease?", overall and by sex*



CVD = cardiovascular disease.
* Respondents were allowed multiple answers. Proportions were calculated as the number of participants who gave a particular response in each subgroup divided by the total population in that subgroup. ◆

(37.0%). Men were significantly more likely than women to identify alcohol misuse (42.9% v 30.2%; $P = 0.002$) as a cause of kidney disease.

Using logistic regression to evaluate the overall significance of differences in response distributions, responses differed significantly according to presence or absence of diabetes ($\chi^2 = 33.06$; $P = 0.001$) and according to blood pressure treatment group (treated/untreated/normotensive; $\chi^2 = 50.91$; $P = 0.001$). Awareness of a relationship between CKD and diabetes/hyperglycaemia/excess dietary sugar was significantly higher among those who reported a previous diagnosis of diabetes at the time of the follow-up survey than those never told they had diabetes (25.9% v 7.3%, respectively; $P < 0.001$). However, only 3.3% of people receiving treatment for hypertension at the time of the follow-up survey identified high blood pressure as a risk factor for CKD, compared with 2.7% of respondents with normal blood pressure and 1.8% of respondents with untreated hypertension (the differences between these values were non-significant). Those with untreated hypertension were among the most likely to respond "don't know" (36.4%).

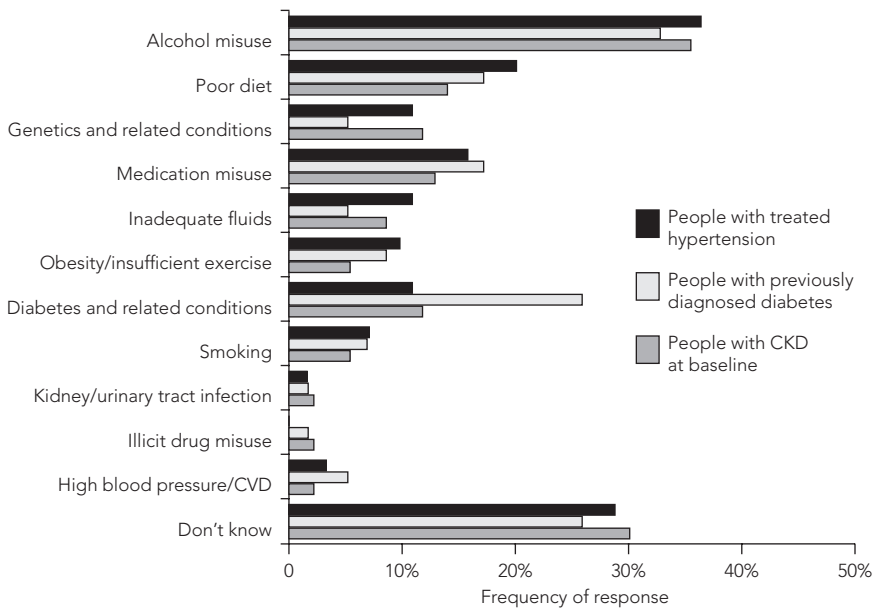
Responses did not differ significantly according to presence or absence of CKD at baseline ($\chi^2 = 16.48$, $P = 0.17$). However, responses differed significantly according to age above or below 60 years ($\chi^2 = 72.73$, $P < 0.001$) and category of educational attainment ($\chi^2 = 116.54$, $P < 0.001$). Respondents who had not completed secondary school were significantly more likely to respond "don't know" (37.3%) than respondents with a secondary or tertiary education (28.0% and 20.0%, respectively) ($P < 0.001$). There was a non-significant tendency for respondents with a tertiary education to more frequently identify diabetes as a risk factor for kidney disease.

Recall of kidney function testing

When respondents were asked "Has a doctor or health care worker ever tested your kidney function, outside of the AusDiab study?", 31.9% replied "yes"; 3.9% said "yes", but only during pregnancy; 26.8% were uncertain, indicating they had undergone an unspecified blood, urine or imaging test; and 37.4% replied that they had never had their kidney function tested.

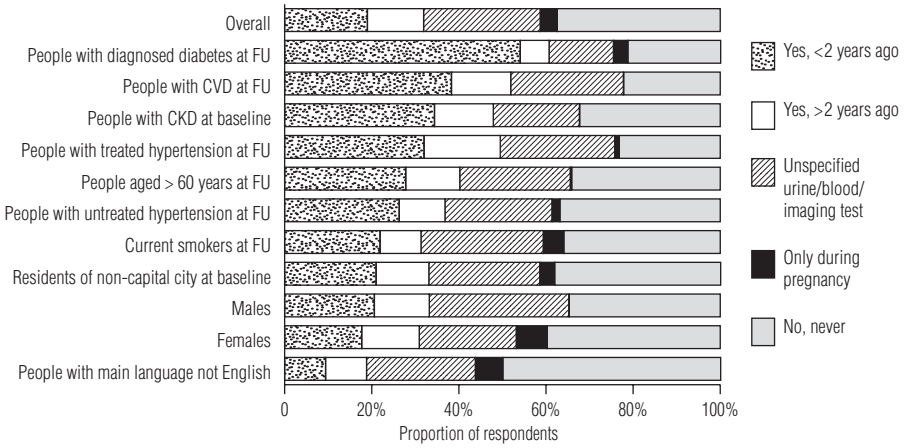
The proportions of respondents in various risk categories who at least suspected they had undergone a kidney function test in the past (other than during the AusDiab study) are shown in Box 4. Those with CKD at the time of the baseline survey more frequently responded that their kidney function had been tested within the previous 2 years (34.4% v 19% overall). Those with known

3 Frequency of the most popular responses to the question "What sort of things do you think may lead to a person developing kidney disease?", by kidney function status and presence of known risk factors*



CKD = chronic kidney disease. CVD = cardiovascular disease.
* Respondents were allowed multiple answers. Proportions were calculated as the number of participants who gave a particular response in each subgroup divided by the total population in that subgroup. ◆

4 Proportion of respondents who recalled having undergone kidney function testing outside of the AusDiab study,[11] by demographic and other characteristics



CKD = chronic kidney disease. CVD = cardiovascular disease. FU = follow-up. ◆

diabetes were the most likely to recall having undergone a test of kidney function within the previous 2 years (54.1%). Women less frequently recalled having had a test of kidney function within the previous 2 years than men (17.7% v 20.6%, respectively), and people whose main language was not English were less likely to recall being tested within the previous 2 years than native English speakers (9.4% v 19.4%, respectively).

DISCUSSION

Awareness of risk factors for kidney disease was low in the cohort surveyed. Most end-stage kidney disease in Australia is attributable to diabetic nephropathy, hypertension and glomerulonephritis (with a range of inflammatory and immune causes).[17] However, only a small proportion of respondents identified diabetes or hypertension as risk factors for kidney disease. The prevailing understanding appears to be that kidney disease is related to alcohol misuse, which may stem from recognition of the role of the kidneys in excreting wastes and toxins, or simply confusion between toxicity to the kidneys and toxicity to the liver. This perception is supported by only a small and somewhat conflicting evidence base.[18,19] Poor diet was also commonly identified by respondents as being related to the development of kidney disease, implying general recognition of the significance of lifestyle factors.

Participants' recollection of being tested for kidney disease was relatively low, even among those previously identified as having CKD or with previously diagnosed diabetes or treated hypertension. Those whose main language was not English were the least likely to recall having undergone a kidney function test in the past. This may reflect poor access to health services, issues with doctor–patient communication, and/or limited understanding of the question.

Our survey was modest in scale, and the loss of many original participants to follow-up between baseline and the 5-year follow-up survey limits the degree to which our findings can be generalised. Compared with the general Australian population, adults aged 25–44 years and those aged 75 years or over were under-represented in our study cohort. Age distribution in the nested cohort was: 32.0% aged 25–44 years, 62.4% aged 45–74 years and 5.5% aged ⩾75 years (compared with 42.5%, 47.9% and 9.6%, respectively, for the overall Australian population).[20] Our study participants had a higher rate of high school completion than the general population over 25 years (64.3% v 45.5%). In addition, fewer people in the nested cohort had diabetes, untreated hypertension or a history of cardiovascular events, or were smokers at baseline, than in the overall cohort (and likely in the general population).

Another limitation of our survey was the exploratory nature of the questions asked. Questions were not formally piloted before conducting the survey. It is possible that many participants, when asked "What sort of things do you think may lead to a person developing kidney disease?", did not have a clear concept of kidney disease, nor of the physiological role of the kidney. Finally, imperfect recall of kidney function testing is likely to result in significant under-reporting, with the additional limitation that communicating what constitutes a kidney function test, to prompt recall, is difficult because of the non-specific nature of blood and urine testing.

Despite constraints on the degree to which our findings may be generalised, they clearly indicate limited knowledge of kidney disease and its risk factors, as well as limited experience or recall of kidney function testing in this cohort of Australian adults. It would appear that some people at highest risk of CKD are unaware of their risk status. Public education is likely to be of vital importance to health promotion and preventive interventions in CKD.

COMPETING INTERESTS

None identified.

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(Received 28 May 2007, accepted 4 Oct 2007) ❑