

## The prevalence of and risk factors for chronic kidney disease in spouses of patients with advanced chronic kidney disease

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### Abstract

**Background:** Clustering of chronic non-communicable diseases has been described in the western world. We embarked on this study to determine spousal concordance of chronic kidney disease (CKD).

**Methods:** A hospital based descriptive cross sectional study of spouses of patients with advanced CKD (stage 4 and 5).

**Results:** A significantly higher prevalence of CKD was detected among spouses of patients with advanced CKD (21%) compared with (6%) in spouses of patients without CKD. Variables associated with CKD included age, hypertension,

diabetes mellitus, chronic use of nonsteroidal anti-inflammatory drugs and use of herbal medication ( $p < 0.05$ ).

**Conclusion:** This study has shown that spouses of patients with advanced CKD are at increased risk of developing CKD.

**Keywords:** Chronic Kidney Disease, Concordance, Diabetes Mellitus, Hypertension, Spouse

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### Introduction

Chronic kidney disease is a worldwide public health problem.<sup>1</sup> It is under diagnosed and under recognized all over the world. There is a rising prevalence of kidney failure associated with unsatisfactory outcomes and high cost.

In recent decades, there has been a shift in the major causes of death and disability from nutritional deficiency and infectious diseases toward non-communicable diseases with the highest mortality caused by cardiovascular diseases.<sup>2</sup> The growing prevalence of CKD is one aspect of this shift.

The worldwide increase in the number of patients with CKD and consequent kidney failure necessitating renal replacement therapy (RRT) has reached epidemic proportions and only a small number of countries with good economies are able to meet the challenges posed.<sup>3</sup> Hence emphasis is now laid on public health approach to the management of CKD as well as intervention to prevent or slow the progression of CKD towards kidney failure and development of cardiovascular disease (CVD). It is hoped that this will improve patient outcome

as well as greatly reduce cost of treatment.

Shared marital environment may contribute to similarities in lifestyle and morbidity in spouses and provide a basis for health promotion and prevention strategies that target the spouses of patients and allow the investigations of determinants related to non-genetic factors.<sup>4</sup> Identifying the relative contributions of shared modifiable environmental risk factors may then improve our understanding and thus enable targeting of detrimental lifestyle, minimizing the rapid increase in the prevalence of CKD as well as slowing the progression.

### Materials and Methods

This study was a hospital based descriptive cross sectional study conducted at the Jos University Teaching Hospital. The subjects for the study were spouses of patients with advanced CKD seen in the hospital. One hundred spouses of patients with advanced CKD (estimated glomerular filtration rate less than 30ml/min/1.73m<sup>2</sup>) were recruited for the study. One hundred age and sex matched spouses of patients without CKD were recruited from the General Out Patient department to serve as controls.

Consecutive spouses of patients with CKD and controls who met the criteria were recruited purposively and each participant was interviewed using a structured questionnaire and physically examined. Items recorded on the questionnaire were subjects' socio-demographic data, history of hypertension, diabetes mellitus, dyslipidaemia, hyperuricaemia as well as history of alcohol consumption, cigarette smoking, chronic ingestion of non-steroidal anti-inflammatory drugs (NSAIDs), herbal medications and recreational drugs. Subjects with heart failure, febrile illness, infections,

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severe wasting diseases like infection with human immunodeficiency virus (HIV), cancer as well as pregnant women were excluded from the study.

Ethical approval for this study was obtained from the Human Research Ethics Committee of the Jos University Teaching Hospital. Participation in this study was voluntary and signed informed consent was obtained from all participants.

Data generated from the study was entered into Microsoft Excel spread sheet and imported into EPI Info 2002 statistical programme version 5.3.2 (CDC, Atlanta, GA) for analysis. Statistical analysis included simple frequency tables, Chi-square, (Fisher's exact where cells had less than five observations) and odd ratios(ORs) computations as appropriate. Statistical significance was set at  $p < 0.05$ .

## Results

A total of 200 subjects participated in the study. One hundred spouses of patients with advanced CKD and one hundred spouses of patients without CKD were recruited as controls. Sociodemographic and clinical characteristics of spouses of patients with advanced CKD and matched controls are listed in Table 1. The prevalence of CKD was significantly higher in spouses of patients with CKD (21%) compared with controls (6%),  $p < 0.05$ . In this study, the mean duration of marriage for spouses of patients with advanced CKD was  $20 \pm 11$  years.

Table 1. Socio-demographic and clinical characteristics of 100 spouses of patients with advanced CKD and 100 age and sex matched controls

Variables	Spouses	Controls	p Value
Males	51	51	0.857
Education			
None	21	20	<0.001
Primary	12	13	
Secondary	25	24	
Tertiary	42	43	
Occupation			
Civil servant	39	39	0.615
Farmer	7	3	
Self employed	20	27	
Unemployed/pensioner	34	31	
Social class			
I	14	18	0.273
II	21	16	
III	4	11	
IV	10	10	
V	51	45	
Hypertension	28	6	<0.001
Diabetes	12	1	0.006
Obesity	32	14	<0.001
Use of NSAIDs	43	23	<0.001
Use of herbal medications	63	21	<0.001
Cigarette Smoking	13	3	0.028
Alcohol ingestion	19	6	0.014
Family history of DM	15	4	<0.001
Family history of hypertension	17	11	0.001
CKD	21	6	<0.001

Table 2. Comparison of associated risk factors between spouses of CKD patients with and without CKD

Variables	CKD present, n(%)	CKD absent, n(%)	p value
Hypertension	17(80.9)	11(13.9)	<0.001
DM	8(38.1)	4(5.1)	<0.001
Alcohol use	11(52.4)	8(10.1)	<0.001
Chronic NSAID Use	19(90.5)	24(30.4)	<0.001
Use of Herbal medication	20(95.2)	43(54.4)	0.001

Table 3. Independent predictors of chronic kidney disease (CKD) in spouses of CKD patients

Variables	Odds ratio	95% CI	p
Age (years)			
25-34	0.78	0.05 - 12.62	0.863
35-44	3.32	0.25 - 43.55	0.361
45-54	5.00	0.20 - 123.41	0.329
$\geq 55$	Reference		
Hypertension	2.43	1.04- 3.39	0.003
DM	1.22	1.06- 7.10	0.047
Alcohol use	5.51	0.32- 14.60	0.084
Chronic NSAID use	1.41	1.07- 7.98	0.032
Use of herbal medication	4.07	0.13- 32.03	0.320

Regarding the associated renal risk factors, there were higher rates of hypertension, diabetes, use of herbal medications and NSAIDs, smoking and alcohol ingestion in spouses of patients with CKD compared with controls (Table 1).

Univariate analysis between subgroups of spouses of CKD patients with and without CKD showed that hypertension, DM, alcohol use, chronic NSAID use, use of herbal medication were associated with risk of CKD in spouses of patients with advanced CKD (Table 2).

Significant factors for CKD on univariate analysis were included as variables for further multiple logistic regression analysis. It confirmed that hypertension, DM and chronic NSAID use were independent significant factors for CKD in spouses of patients with CKD (Table 3).

## Discussion

Spousal concordance of health risks and behaviours has been observed in many diseases. They include cardiovascular diseases, hypertension, metabolic syndrome and high fasting glucose levels which are all risk factors for CKD.<sup>5,6,7</sup>

There was a significantly higher prevalence for CKD in spouses of patients with advanced CKD, 21% compared with 6% in matched controls ( $p < 0.05$ ). The finding of a high prevalence of CKD in spouses of patients with advanced CKD is consistent with that reported by Tsai et al<sup>8</sup> which showed a significantly

higher prevalence of CKD in spouses of CKD patients compared with age and sex matched controls. Although this study is focused on spousal concordance of CKD, a number of studies has evaluated the prevalence of CKD in family members of patients with CKD.<sup>9</sup> For instance in a population based screening for microalbuminuria among relatives of CKD patients by Bello AK et al<sup>10</sup>, the prevalence of microalbuminuria among participants with a family history of CKD was significantly greater than the prevalence of sex and age matched controls with no family history of CKD, 9.5% compared with 1.4%. (p=0.001) Similarly, Kong et al,<sup>11</sup> reported a higher prevalence of albuminuria among first degree relatives of dialysis patients, 14.4% compared with 8.4% (p<0.001).

Several theories have been proposed to explain concordance including the tendency of people to select partners who are already similar to themselves as well as shared environmental and lifestyle behaviours. In this study, the mean duration of marriage for spouses of patients with advanced CKD was 20±11 years. Thus the shared environmental factors and health behaviours of spouses may account for the higher prevalence of CKD in spouses of patients with advanced CKD because when people marry, they share the same environment, financial resources and social network. The shared environment translates into shared health risk that can be beneficial or detrimental to health depending on the environment and health behavior of the spouses.. Thus, the shared environmental factors and health behaviours of spouses or the high prevalence of CKD in Nigeria may have accounted for the higher prevalence of CKD in spouses of patients with CKD.<sup>12</sup> The prevalence of CKD in spouses of patients with advanced CKD found in this study is however in contrast with that reported by O'Dea et al<sup>13</sup> which stated that spouses of patients with end stage renal disease (ESRD) showed relatively lower prevalence of CKD compared with first degree relatives of patients with CKD. The higher prevalence of CKD in relatives may be explained by the influence of genetic traits and non-genetic environmental factors.

This study showed more spouses of CKD patients were hypertensives. The finding of a higher prevalence of hypertension among spouses is similar to that reported in previous studies. For instance, Downes et al<sup>14</sup> reported that hypertensive vascular disease was significantly associated between spouses. Speers et al<sup>15</sup> also demonstrated spousal concordance of hypertension.

Hypertension is an independent risk factor in the development and progression for CKD.<sup>16</sup> In addition, hypertension is reported to be a major cause of CKD in Nigeria and in other parts of tropical Africa.<sup>12</sup> The high prevalence of hypertension among spouses of CKD patients can be explained by assortative mating and shared environmental risk factors and health behaviours.

Also from this study, a significantly higher proportion of spouses of patients with CKD were

diabetics. This finding is in agreement with the study conducted by Tsai JC et al which reported DM as a significant independent risk factor for developing CKD in spouses of patients with CKD. Diabetes mellitus is a leading cause of CKD and ESRD.<sup>17</sup> Similarly, an increasing prevalence of diabetes as a cause of ESRD has been reported in Nigeria.<sup>18</sup> While genetic influences on the risk of type 2 DM are likely to be significant, genetic factors do not fully explain the rapid increase in prevalence of the condition, hence environmental factors have a major influence. These factors include obesity, diet, physical activity and shared environmental factors. Cohabitation of couples stressed the importance of environmental factors in developing DM and CKD.

As regards the use of nephrotoxic agents a significantly higher proportion of spouses of CKD patients admitted to chronic use of NSAIDS and herbal medications. The high prevalence of CKD in spouses may be partly explained by the higher proportion of chronic NSAID use and use of herbal medication in spouses of patients with CKD. Also results from spousal concordance studies for behaviours contend that married couples are similar in many health behaviours including alcohol consumption, drug abuse and substance abuse.<sup>19,20</sup>

The study was conducted with limited number of participants. This could have impacted our findings. A comprehensive long term population based screening programme is needed to substantiate the findings of this study.

### Conclusion

This study has shown that spouses of patients with advanced CKD are at increased risk of developing CKD. Independent risk factors found to be associated with CKD in this study were hypertension, DM and chronic use of NSAIDS. These findings are of significance clinically as they provide the rationale that a targeted screening and treatment program for CKD should be conducted not only for genetic family members of patients with CKD, but also for spouses of patients with CKD. Screening for CKD should be conducted for spouses of patients with advanced CKD. This will ensure the cost effectiveness of CKD prevention and management as well as achieve improved patients' outcomes.

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