

# The prevalence and clinical interpretation of pyuria in chronic kidney disease patients

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## Introduction

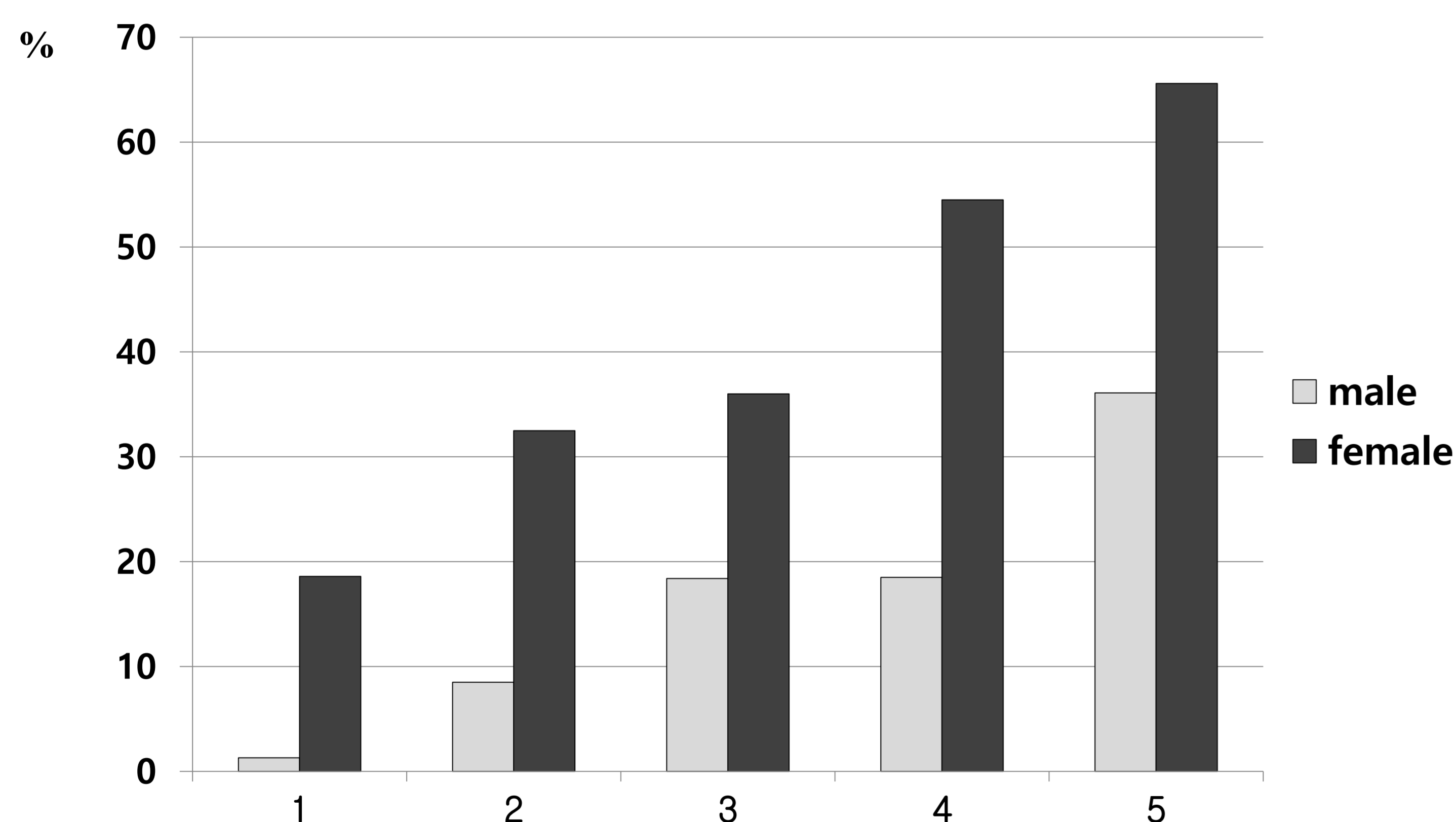
- Pyuria is a helpful marker for urinary tract infection (UTI) in general population. Meanwhile, pyuria is not infrequent in advanced chronic kidney disease (CKD) patients even without UTI in clinical practice.
- There has been assumption that sterile pyuria can be seen in CKD due to chronic renal parenchymal inflammation, but data are virtually nil, and the reference value of white blood cell (WBC) count in CKD patients is not known.
- We aimed to investigate the prevalence and characteristics of pyuria in CKD, and examined the urine of CKD including hemodialysis (HD) patients by differential counting of WBC in urine.

## Methods

- Cross-sectional study
- Routine urine analysis with microscopy (UA) was performed during the study period in non-dialysis CKD patients of outpatient clinic and stable HD patients who voids at least once a day.
- Pyuria was defined as white blood cell (WBC)  $\geq$  5-10/HPF by urine microscopy.
- Urine culture and WBC differential counting was done in case UA shows pyuria.
- Culture-positive pyuria was defined as UTI.

## Results

### 1. The prevalence of pyuria



1. General population (n=4508)  
: eGFR  $\geq$  60ml/min/1.73m<sup>2</sup> in health medical examination
2. CKD stage 3 (n=138)
3. CKD stage 4 (n=65)
4. CKD stage 5 (non-dialysis) (n=21)
5. HD patients (n=68)

### 2. Pyuria as a predictor of UTI in CKD

- Co-morbid diabetes was more common (39% vs 61%, p=0.046) and hs-CRP was higher (0.17 $\pm$ 0.20 vs 0.37 $\pm$ 0.46, p=0.031) in pyuria group.
- UTI was observed in 45.7% (2 in male, 14 in female) of the non-dialysis CKD patients with pyuria (n=35, male 12, female 23). By comparison, of the 34 HD patients with pyuria, only 6 cases (17.6%. 1 in male, 6 in female ) were proven to be UTI.
- Among the pyuria group (Sterile pyuria vs UTI)
  - The degree of WBC number in urine was significantly higher in UTI group (WBC  $\geq$  60/HPF was 66.7% in UTI and 14.2% in sterile pyuria).
  - In WBC differential counting, the majority of WBC was neutrophils even in sterile pyuria (67.6%).
  - However, the percentage of lymphocytes was much greater in sterile pyuria compared to UTI (17.4% vs 1.2%, p=0.007).

## Conclusion

- Sterile pyuria is common in advanced CKD including male patients.
- Lots of WBCs in urine (WBC  $\geq$  60/HPF) could be a predictor of UTI in CKD patients as well as in general population.
- Contrary to our expectations that lymphocytes would comprise the most of WBCs, the majority of WBC was neutrophils in sterile pyuria of CKD after WBC differential counting.
- However, the percentage of lymphocytes was much greater in sterile pyuria compared with UTI in CKD population.
- The clinicians should be careful when they suspect UTI in CKD patients with pyuria.
- It might give more information regarding the pathophysiology of CKD if we examine the pattern of pyuria in more diverse CKD population.

## Reference

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