Detection of *Mycobacterium Tuberculosis* and Rifampicin-Resistant Gene among Hemodialysis Patients in Khartoum, Sudan: Using GeneXpert Assay

Sir,

There was an increase in the prevalence of tuberculosis (TB) among individuals with end-stage renal disease on dialysis or those who received renal transplant.[1] Worldwide, TB infection in dialyzed patients ranges from 5% to 25% and a 6.9–52.5-fold risk of TB is reported as compared to the general population. This was attributed to the impaired cellular immunity in these patients.[2] The GeneXpert *Mycobacterium* tuberculosis/rifampicin (MTB/RIF) test has high sensitivity and specificity for detecting pulmonary and extrapulmonary TB and is also used to detect anti-TB medication resistance.[3]

This is a cross-sectional, hospital-based study that recruited 100 patients undergoing renal hemodialysis. This study was conducted in Khartoum Hospital during April–July 2019. These samples were tested using Ziehl–Neelsen stain, X-ray, erythrocyte sedimentation rate test, and GeneXpert assay method to detect MTB/RIF by GeneXpert assay. The collected data were analyzed using SPSS version 21 (IBM, Chicago, USA), and Univariate and multivariate logistic regression analyses were used.

We found seven (7%) patients with TB positivity, and GeneXpert assay showed sensitivity of all patients to RIF. The mean age of the patients was 46.12 ± 1.95 years; four (57%) of them were female and three patients were male (42.8%). Two patients had a history of contact with TB patients and four patients had HIV diagnosed. In this study, some variables were more commonly associated with active TB among hemodialysis patients than others, for example, logistic regression revealed significant association with: fever (odds ratio [OR]: 2.7, 95% confidence interval [CI]: 0.5–12.8, $P < 0.01$), chest pain (OR: 6.4, 95% CI: 1–39.4, $P < 0.01$), night sweats (OR: 8.8, 95% CI: 1.5–49.7, $P < 0.01$), chills (OR: 4, 95% CI: 0.28–7, $P < 0.01$), and HIV (OR: 4.9, 95% CI: 0.4–55.2, $P < 0.01$), as shown in Table 1.

In this study, the prevalence of TB among hemodialysis patients was 7%. The mean age of the patients is less than that of the study by Ates *et al.,* in which the mean age of the patients was above 50 years.[2] However, in a similar study conducted in Sudan among peritoneal dialysis patients, the mean age of TB patients was 37 years, which is consistent with the fact that end-stage

Table 1: Factors associated with active tuberculosis among hemodialysis patients in Khartoum state

Variables	*n* (%)	Univariate analysis			Multivariate analysis		
		OR	95% CI	*P*	OR	95% CI	*P*
Age	46.12±1.95	1	1-1	>0.01			>0.01
Gender	Male 59% and female 41%	0.496	0.11-2.3	>0.01	0.3	0.06-2	>0.01
Hemodialysis	Acute 80% and chronic 20%	0.6	0.1-3.3	>0.01	0.64	0.1-3.5	>0.01
Previously treated for TB	2%			>0.01			>0.01
Follow-up	2%			>0.01			>0.01
HIV	4%	5	0.4-55.6	<0.01	4.9	0.4-55.2	<0.01
Fever	34%	2.8	0.6-13.3	<0.01	2.7	0.5-12.8	<0.01
Prolonged cough	100%			>0.01			>0.01
Bloody cough	57%			>0.01			>0.01
Chest pain	32%	6.1	1.1-33.4	<0.01	6.4	1-39.4	<0.01
Weight loss	66%	0.7	0.14-3.2	>0.01	0.6	0.1-3.2	>0.01
Fatigue	98%			>0.01			>0.01
Night sweats	25%	9.1	1.6-50.6	<0.01	8.8	1.5-49.7	<0.01
Chills	52%	1.2	0.27-5.9	<0.01	1.4	0.28-7	<0.01
Loss of appetite	94%			>0.01			>0.01
History of contact	2%			>0.01			>0.01

OR: Odds ratio, CI: Confidence interval, TB: Tuberculosis, HIV: Human immunodeficiency virus

renal failure (ESRF) in Sudan is predominantly affecting the younger population.[4] In addition, the percentage of duration of hemodialysis among patients was about 80% less than 24 months and 20% equal or longer than 24 months, and the period of hemodialysis in TB patients was equal or longer than 24 months.[5] The risk of TB increased in 24 months of hemodialysis in the United Kingdom.[6] Although it has been reported that it is difficult to diagnose TB from the sputum of patients with ESRF,[7] in this study, we found six patients positive for TB by GeneXpert assay. Interestingly, in Sudan, GeneXpert showed high sensitivity and specificity.[2] Further research is needed to assess the success of treatment of TB in hemodialysis patients.

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Conflicts of interest

There are no conflicts of interest.

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