International Journal of Academic Health and Medical Research (IJAHMR)
ISSN: 2643-9824
Vol. 5 Issue 8, August - 2021, Pages: 22-26

The Role of Cytological Methods in Evaluate Urine of Sudanese Patients with Renal Failure

Enas Jafar Yousif, P.hD [1], Hadeel Hatim Mubarak, B.Sc [2] , Alia Abdelrahman Eshag, B.Sc [2], Alkhair Abd Almahmoud Idris, P.hD [3]

1- Karary University-Sudan.
2- Ministry of Health, Sudan.
3 -Ahfad University for Women, Sudan.

Corresponding author:
Dr.Alkhair Abd Almahmoud Idris, Ahfad University for Women, Omdurman - Sudan, P.O. Box: 167 Omdurman, Sudan. Tel: (+249) 9247063310, E-mail: alkhair20@hotmail.com

Abstract: ***Background:*** *Renal failure is a major health problem in Sudan and each year the number of patients is increasing.* ***Aim:*** *To determine the cytological changes of urinary tract cells among patients suffering from renal failure.* ***Materials and methods:*** *This was descriptive laboratory based study conducted in Khartoum State. A random sample of 85 urine samples were taken from (all ages and both sexes) patients with renal failure lives in Khartoum; the remaining 35 samples was taken from health population as control. Questionnaire containing essential patient identification data was used.* ***Results and discussion:*** *Statistical analysis showed that there was significant statistical association between age, gender, medical history of chronic disease and type of renal failure (acute or chronic) to chronic changes in urinary tract cytology in terms of bacterial, Candida, Trichomonas infections (P-value < 0.05).* ***Conclusion:*** *We conclude that our study highlighted the role of urine cytology as screening tool for patients with renal failure as adjusted method to other clinical investigations. The inflammation and infection, bacterial, parasitic or fungal are the most common.*

Keywords: Renal failure, cytology, *trichomonas*, *Candida*, *bacteria*

Introduction:

Renal failure or kidney failure (formerly called renal insufficiency) describes a medical condition in which the kidneys fail to adequately filter toxins and waste products from the blood [(1)]. The two forms are acute (acute kidney injury) and chronic (chronic kidney disease); a number of other diseases or health problems may cause either form of renal failure to occur [(2)].

Renal failure is described as a decrease in the glomerular filtration rate. Biochemically, renal failure is typically detected by an elevated serum creatinine level. Problems frequently encountered in kidney malfunction include abnormal fluid levels in the body, deranged acid levels, abnormal levels of potassium, calcium, phosphate, and (in the longer term) anemia as well as delayed healing in broken bones. Depending on the cause, hematuria (blood loss in the urine) and proteinuria (protein loss in the urine) may occur. Long-term kidney problems have significant repercussions on other diseases, such as cardiovascular disease [(3)].

Efforts to detect urinary tract infections are based on the assumption that detection reduces the likelihood of subsequent morbidity from infection, sepsis, or chronic renal disease [(4)].

The risk for such complications depends on the clinical situation, including the age and gender of the patient [(5)]. For some patients, such as pregnant women, the risk is well defined and treatment is indicated; for most, however, the most significant morbidity may be related to the side effects of inappropriate treatment. It is therefore critical that the physician appreciate the implications of bacteriuria in different settings [(6)].

In many instances a report from the clinical laboratory indicating candiduria represents colonization or procurement contamination of the specimen and not invasive candidiasis. Even if infection of the urinary tract by *Candida* species can be confirmed, antifungal therapy is not always warranted [(7)].

Urinary tract infections remain one of the significant health increasing issues among patients with renal failure. Detection of these infections well help in suitable interventions for treatment. Screening of cytological feature of urine is one of the most

important laboratory investigations that could be used in this regard. The relationship between the severity of renal failure, type of cytological examination results, some demographic data and medical history of the patients could give good insight about the incidence of certain types of infections including *Bacteria*, *Trachomas*, and *Candida* among patients with renal failure both males and females and of different age groups and medical history of chronic diseases.

This study, generally aimed to determine the cytological changes of urinary tract cells in Sudanese patients suffering from renal failure.

Material and Methods:

Study design:

This is a descriptive laboratory based study amid to describe the cytological changes in patients complaining from Renal Failure.

Study area:

This study was conducted in Khartoum State -Sudan

Study population:

About 85 urine samples were taken from (all ages and both sexes) patients with renal failure lives in Khartoum; the remaining 35 samples were taken from health population as control. Questionnaire containing essential patient identification data was used.

Sample size:

About 120 urine samples were including in this study.

Sample collection and preparations:

Full voided urine samples were collected from patient's complaining of Renal Failure and healthy people. Each urine sample was centrifuged at 1500 RPM for 5 minutes, the supernatant was discarded from the tube, and the sediment was placed on the one end of the slides coated with suitable adhesive media using Pasteur pipette, then smears were made using a spreader. After that smears were stained by:

A. Papanicolaou stain:

Smears were treated with 95% alcohol for minute then treated with 70% alcohol for 2 minutes, rinsed in distilled water for 3 minutes and then treated with filtered Harris haematoxyline for 2-5 minutes rinsed in tap water for 1 minute and then treated with 1% alcohol for 3 seconds then in tap water for 2 minutes treated with ammoniated water for 1 minute [(18)].

B. Hematoxylin and eosin (H & E)

Smears were treated with 95% alcohol for 15–20 min. Distilled water added for two minutes. Then stained with Harris haematoxyline for 8 min. The specimen put under running tap water for 10 min. The samples were differentiated with 1% acid alcohol for 1 second. Then washed in tap water for 2 min. Stained with Eosin for 3 – 5 min. Dehydrated with alcohol gradient (70%, 75%, 95%). Then the samples cleared with Xyline then mounted with DPX [(18)].

C. May Grunwald Giemsa (MGG)

Fixation in 95% alcohol for 15 min. Then rinsed in 70% alcohol for 1 – 2 min. Washed in water. After that stained with MG, and then with Geimsa for 10 minute, washed in water for 8 min. Drying was done by air, then mounted with DPX [(18)].

Results

Table (1) Age and cytological examination results

Subjects	Age categories	Cytological examination								Total	
		Nil		Bacterial		Candida		Tricomonas vaginalis			
		F	%	F	%	F	%	F	%	F	%

case	**> 25 years**	0	0.0	19	15.8	0	0.0	0	0.0	**19**	15.8
	25 - 45 years	0	0.0	7	5.8	18	15.0	33	27.5	**58**	48.3
	Above 45 years	0	0.0	0	0.0	3	2.5	5	4.2	**8**	6.7
Total		**0**	0.0	**26**	21.6	**21**	17.5	**38**	31.7	**85**	70.8
Control	**> 25 years**	5	4.2	7	5.8	0	0.0	1	0.8	**13**	10.8
	25 - 45 years	0	0.0	10	8.3	0	0.0	0	0.0	**10**	8.3
	Above 45 years	3	2.5	4	3.3	4	3.3	1	0.8	**12**	10.0
Total		**8**	**6.7**	**21**	**17.4**	**4**	**3.3**	**2**	**1.6**	**35**	**29.0**

P- Value (0.002) (Significant)

As shown in **Table (1)** few of the control subjects 8.3% showed only bacterial infection on cytological examination in the age group (25 – 45 years). On the other hand, 5.8%, 15% and 27.5% of case in the same age group exhibited bacterial, *Candida* and *Tricomonas vaginalis*, respectively as changes based on cytological examination of urine of patients with renal failure. The incidence of bacterial, *Candida* a *Tricomonas vaginalis*, increased should positive results with age group. Chi squire test showed significant relationship between the two variables (P <0.05).

Table (2) Gender and cytological examination results

Subject	**Gender**	**Cytological examination**								**Total**	
		Nil		**Bacterial**		**Candida**		***Tricomonas vagnalis***			
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Case	**Male**	0	0.0	22	18.3	11	9.2	10	8.3	**43**	35.8
	Female	0	0.0	4	3.3	10	8.3	28	23.3	**42**	34.9
Total		**0**	0.0	**26**	21.6	**21**	17.5	**38**	31.6	**85**	70.8
Control	**Male**	7	5.8	11	9.2	0	0.0	0	0.0	**18**	15.0
	Female	1	0.8	10	8.3	4	3.3	2	1.7	**17**	14.1
Total		8	6.6	21	17.5	4	3.3	2	1.7	35	29.1

P -value (0.004) (Significant)

Results in **Table (2)** shows that among the control subjects cytological examination showed that 5.8% nil, 9.2% bacterial among males, and 0.8% nil, 8.3% bacterial, 3.3% *Candida*, and 1.7% *Trichomonas vagnalis* among females. Among case subjects, positive test varied between males and females, 18.3% bacterial, 9.2% *Candida*, and 8.3% *Trichomonas vagnalis* among males, while 3.3% bacterial, 8.3% *Candida*, and 23.3% *Trichomonas vagnalis* among females. It should be noted that bacterial infection was more common among males, while *Candida*, and *Trichomonas vagnalis* were more common among females. Chi squire test showed significant relationship between the two variables (P < 0.05).

Table (3) Renal failure and Cytological examination results

Subject	**Degree of RF**	**Cytological examination**								**Total**	
		Nil		**Bacterial**		**Candida**		**Tricomonas**			
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Case	**Acute**	0	0.0	26	21.7	11	9.2	17	14.2	**54**	45.1
	Chronic	0	0.0	0	0.0	10	8.3	21	17.5	**31**	25.8

Total	**0**	**0**	**26**	**21.7**	**21**	**17.5**	**38**	**31.7**	**85**	**70.9**

P -value (0.001) (Significant)

As indicated in **Table (3)** among those subjects with acute renal failure cytological examination showed that 21.7% bacterial, 9.2% *Candida*, and 14.2% *Trichomonas*. Among those with chronic renal failure, 8.3% *Candida*, and 17.5% *Trichomonas*. It should be noted that bacterial infection and *Candida* were more common among those with acute renal failure, while *Trichomonas* was more common among those with chronic renal failure . Chi squire test showed significant relationship between the two variables ($P \leq 0.05$).

Table (4) Clinical History and cytological examination results

Subject	Medical history	Cytological examination								Total	
		Nil		Bacterial		Candida		Tricomonas			
		F	%	F	%	F	%	F	%	F	%
Case	**Hypertension**	0	0.0	19	15.8	14	11.7	8	6.7	**41**	34.2
	Diabetes	0	0.0	7	5.8	0	0.0	7	5.8	**14**	11.6
	Hypertension and diabetes	0	0.0	0	0.0	0	0.0	13	10.8	**13**	10.8
Total		**0**	0.0	**26**	21.6	**14**	11.7	**28**	23.3	**68**	56.6
Control	**None**	6	5.0	17	14.2	0	0.0	0	0.0	**23**	19.2
	Hypertension	0	0.0	1	0.8	4	3.3	2	1.7	**7**	5.8
	Diabetes	0	0.0	3	2.5	0	0.0	0	0.0	**3**	2.5
Total		**6**	**5.0**	**21**	**17.5**	**4**	**3.3**	**2**	**1.7**	**33**	**27.5**

P- value (0.004) (Significant)
As shown in **Table (4)** few of the control subjects 21.6 % showed only bacterial infection on cytological examination among those with clinical history of hypertension, diabetes and both hypertension and diabetes. On the other hand, 15.8%, 11.7% and 6.7% of cases exhibited bacterial, *Candida* and *Tricomonas* , respectively as changes based on cytological examination of urine of patients with clinical history of hypertension. Moreover, 5.8%, and 5.8% of cases exhibited bacteria and *Tricomonas*, respectively as changes based on cytological examination of urine of patients with clinical history of diabetes. The incidence of bacterial, *Candida* a *Tricomonas vaginalis*, should positive results among cases with clinical history of hypertension. Chi squire test showed significant relationship between the two variables ($P < 0.05$).

Discussion:

Concerning relationship between positive cytological tests for urine changes due to renal failure, the findings showed that there is high incidence of bacterial, *Candida* and *Tricomonas*, among case group than control. **Table (1)** illiterate increased incidence of bacterial, *Candida* a *Tricomonas*, positive results with age group. Chi squire test showed significant relationship between the two variables ($P < 0.05$). In Sudan, one study found that medium aged patients with renal failure who have undergone short-term urinary catheterization experienced increased symptomatic infection when asymptomatic bacteriuria and other infection persisted [(8)].
The finings showed that positive results of cytological examination in terms of bacterial, *Candida*, and *Trichomonas vagnalis* was found to be more evident among cases than control **Table (2)**. Moreover, bacterial infection was more common among males, while *Candida* and *Trichomonas vaginalis* were more common among females. Chi squire test showed significant relationship between the two variables ($P < 0.05$).
A previous study by Roberto and his colleagues mentioned that: (Female patients were more susceptible than male (11/22, 50% *vs*. 8/22, 36.35%; $p < 0.042$). Five-year survival rate was 94.5% (49/52 patients). Kidney Graft exit update is 47/52 (90.2%), and there were no significant differences between graft rejection and urinary tract infection (UTI) ($p = 0.2518$). Isolated bacteria were *Escherichia coli* (31.5%), *Candida albicans* (21.0%) and *Enterococcus* spp. (10.5%), followed by *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Morganella morganii*, *Enterobacter cloacae* and *Micrococcus* spp. Secondary infections were produced by (7/19, 36.8%))[(9)].

As indicated in **Table (3)** among those subjects with acute renal failure cytological examination showed that bacterial infection and *candida* were more common among those with acute renal failure, while *Trichomonas* was more common among those with chronic renal failure. Chi squire test showed significant relationship between the two variables ($P < 0.05$). In a cross-sectional

prospective screening study carried out in Khartoum during the period from October 2008 to April 2009.The study assessed the cytological pattern in urine of patients with renal failure. Using conventional cytological stain Papanicolaou and Diff Quick stains. In this study 300 samples were collected from patients with renal failure. Examinations of cytological smears revealed no cytological atypia were detected, inflammatory cells in 31 (10.3%) were detected among cases. Furthermore, different infectious conditions were detected 16 (5.3%) of bacterial infection, 3 (1%) of Candida, 3 (1%) of *trichomonas* were detected among cases. These findings suggest that urine cytology is important for monitoring different infectious conditions that affect renal failure patients [(10)]. These results are similar to those of Kanisauskaite et al [(11)], who reported UTI in 37% of 57 patients, and Memikoglu [(12)], who found UTI in 41% of 136 patients in Turkey. However, these numbers of patients are lower than those reported by Poumard *et al* [(13)], who found UTI in 54% of 179 patients in Iran.

As shown in **Table (4)** positive results of cytological examination among those with clinical history of chronic diseases were less among control than cases. The incidence of bacterial, *Candida* and *Tricomonas*, was increased should positive results among cases with clinical history of hypertension. Chi squire test showed significant relationship between the two variables ($P < 0.05$).

We conclude that our study highlighted the role of urine cytology as screening tool for patients with renal failure as adjusted method to other clinical investigations. The inflammation and infection, bacterial, parasitic or fungal are the most common.

We recommend regular screening of pathologic abnormalities in urine cytology among renal failure patients using conventional stains is highly recommended to detect abnormal cytological changes.

Acknowledgement:

We would like to acknowledge Dr. Ismaiel Osman Khalid in the Military Hospital - Omdurman for specializing some of his valuable time and effort to help us in collection of samples.

References:

1. Klahr S, and Miller S . "Acute oliguria". *N Engl J Med* 1998; 338 (10): 671–5.
2. Grinsted, P., (2005). "Kidney failure (renal failure with uremia, or azotaemia)". http://www.netdoctor.co.uke.htm. accessed 2011-06-26.
3. Andy S. *Understanding Treatment Options For Renal Therapy*. Deerfield, Illinois: Baxter International In.2007; pp. 6.
4. Colgan R, Nicolle L., and McGlone A. Asymptomatic bacteriuria in adults. *Am Family Physician* 2006; 74:985.
5. Nicolle L., Bradley S, and Colgan R. Infectious Diseases Society of America guidelines for diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis* 2005; 40:643.
6. Hooton T, Scholes D and Stapleton A. A prospective study of asymptomatic bacteriuria in sexually active young women. *N Engl J Med 2000*; 343: 992.
7. John F, Jack D, Carol A and Cheryl A. *Candida* and other Urinary Tract Infections—Treatment among patient with renal failure. *Clin Infect Dis.* 2011; 52 (6): 457-466.
8. Elnour, E. Cytological Changes in Urines from Patients Complaining of Renal Failure, M. Sc. Thesis, Sudan University for Science and Technology.2009:89-92
9. Rivera-Sanchez R, Delgado-Ochoa D, Espinoza-Hernandez R, Flores-Paz R, Garcia-Jimenez E, Bazan-Burges A, Arriaga-Alba M. Prospective study of urinary tract infection surveillance after kidney transplantation. *BMC Infectious Diseases 2010*; 10:24510-245.
10. Memikoğlu KO, Keven K, Sengül S, Soypaçaci Z, Ertürk S, Erbay B: Urinary tract infections following renal transplantation: a single-center experience. *Transplant Proc* 2007; 39:3131-3134.
11. Tincello DG and Richmond DH. Evaluation of reagent strips in detecting asymptomatic bacteriuria in early pregnancy: prospective case series. BMJ 1998; 316:435.
12. Kanisauskaite E, Kuzminskis V, Bumblyte IA, Maslauskiene R, Pakalnyte R: The beginning of kidney transplantation in Kaumas [results of Medicine-Hospital 2000-2004]. *Medicina [kaunas]* 2005, 41(Suppl 1):87-92.
13. Poumard G, Salem S, Mehrsai A, Taherimahmoudi M, Ebrahimi R, Pourmand MR: Infectious complications after kidney transplantation: a single-center experience. *Transplant Infect Dis* 2007; **9:**302-309.