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Evaluation of Urine Examination Findings in the Known Patients with Kidney Disease.

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KEYWORDS

Kidney Disease, Urinalysis, Haematuria, Proteinuria, Glycosuria, Microscopic Examination.

ABSTRACT:

Kidney diseases have become a major cause of the increased death rate in developing countries.

In the diagnosis and management of kidney disease, the nephrologist should require a number of specific and non-specific investigations, such as blood tests, electric glomerular filtration rate, serum creatinine, blood urea nitrogen test, cystatin C test, kidney biopsy, kidney ultrasound, and urine examination, which help to identify the pathogenic or functional abnormality of the kidney. We know that all the diagnostic tests are useful to diagnose and manage kidney disease, but we also know that many of them come at a very expensive price, which a poor patient would think twice about before spending. In such a situation, along with the inexpensive tests, urine testing proves to be a valuable test for such patients. Urine examination is an important diagnostic tool to evaluate kidney disease. This examination consists of: 1. physical examination, which deals with the examination of color, appearance, volume, pH, and specific gravity. 2. Chemical examination of urine includes examination of protein, sugar, ketone bodies, bile salt, bile pigment, urea, and blood. 3. Microscopic examination consists of the determination of cells such as WBC's, RBC's, epithelial cells, and cast, crystals, bacteria, and miscellaneous substances.

Methods:

We collected 300 known kidney patient urine samples at GSVM Medical College Kanpur and the School of Health Sciences, CSJM University Kanpur, and performed them in the laboratory manually. We prepared a urine smear using urine sediment obtained by centrifugation of urine and examined the smear microscopically as well as grossly (physical examination) and chemically.

Results:

When we did a urinalysis of 300 known kidney patients, we found that 70% of the patients had proteinuria, of which 40% were male and 30% were female; about 10% of these patients had proteinuria with glycosuria. In microscopic examination observations, 70% of patients have hematuria, 94% have 1–10 epithelial cells/hpf, and 6% have 10–25 epithelial cells/hpf. And 54% of patients have an abnormal Pus cell count. We also observed some crystals like Uric acid, amorphous urate, calcium oxalate, and triple phosphate in 28% of the patient samples.

Conclusion:

Urine testing has shown the potential to be a good diagnostic tool for kidney patients, which helps urologists in treating kidney patients and also help in investigating the current condition of the patients. Testing for protein in urine has proved to be a good test to check the pathological condition of the kidney. Proteinuria with glycosuria gives an indication of the association of kidney disease with diabetes.

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Introduction:

In developing countries, chronic disease has become a major cause of the increased rate of death; there are 4 out of 5 patients suffering from chronic disease who have died in low- or middle-income countries [1]. Today, health programs designed to prevent chronic disease are only looking at diabetes, hypertension, and cardiovascular disease; kidney disease is not getting the same attention in these programs as it is for other diseases. However, some developing and developed countries have highlighted the importance of chronic kidney disease with risk factors, as well as the prevalence of the disease and it's processing into end-stage renal disease. In addition, the financial burden of renal replacement surgery as a result of kidney disease progress [2, 3].

Apart from the Complete blood count or biochemical analysis, Urine examination is the third most important test, which is use in clinical practice to diagnose kidney disease [4]. A correct urine examination result provides valuable information for determining the state of the patient's kidneys and genitourinary system and also helps to monitor other systems of the body. A microscopic examination of urine is performed using urine sediment obtained on centrifugation of the urine by a trained lab technician. Although manual analysis procedures for urine analysis are standardized [5], conventional microscopy of urine sediment has wide variability and is time-consuming, imprecise, and labour-intensive [6, 7].

By taking the patient's history and performing physical examination, kidney imaging and biochemical testing of serum, microscopic examination of the patient's urine sediment provides the physician with appropriate information to rationally diagnose the patient. It is helpful to evaluate patients with acute kidney injury, Proteinuria and Haematuria [8]. An efficient urine test, primarily by a pathologist, can provide information that cannot be obtained from automated urine processing or testing performed by a laboratory technician. An expert in urine microscope can identify changes in the morphology of urine cells, identify cellular and non-cellular casts with accuracy, and identify numerous endogenous and drug-related crystals in urine. These findings make the diagnosis of kidney disease easier. As a result the microscopic examination of urine sediment has been considered a "liquid biopsy", which provides a window for the diagnosis of kidney disease [8-10].

Materials and Methods:

Sample Size:

About 300 urine samples of known kidney patients are collected from the department of pathology at GSVM Medical College Kanpur and the School of Health Sciences at CSJM University Kanpur.

Study Duration:

This study was conducted in the last six months of the academic year 2023–24.

Study Place:

GSVM medical college Kanpur and School of Health Sciences, CSJM University Kanpur.

Study Design:

Urine samples of known kidney patients were collected from the department of pathology at GSVM Medical College Kanpur and the School of Health Sciences, CSJM University Kanpur and examined physically, chemically, and microscopically in the laboratory, maintaining all the safety protocols during handling the samples until the release of the results. We collected all the data points obtained from the examination of samples physically, chemically, and microscopically.

Data Collection, Sampling and Storage:

Samples are collected from the patient with kidney disease at the patient ward and also from the non-admitted patient visited for routine checkups during dialysis or with other kidney diseases. All instructions were given to the patient related to the sampling process. A sterile plastic container in a sealed plastic bag was given to the patient for sample collection for routine examination; in case of delay, the sample was collected in a boric acid tube for microscopic examination to prevent contamination of the sample. In case of delay in examining the sample, it has been stored at 4°C for up to 24 hours.

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General Requirements:

Reagents used in urine examination include: acetic acid, sulphosalicylic acid, Benedict's reagent, ammonium sulfate salt, sodium nitroprusside, Liquor ammonia, sulfur powder, Ehrlich's aldehyde reagent, 10% barium chloride, Fouchet's reagent, benzidine, glacial acetic acid, and hydrogen peroxide, Reagent Strips

Other general requirements include: pH paper, test tubes, glass slides, coverslips, droppers, sprit lamp, test-tube holder, test tube stand centrifuge, microscope, urinometer, and the container for specific gravity measurement.

Investigation:

Urine Examination: A routine urine examination consists of three parts, as follows: Physical examination includes volume, color, transparency, pH, and specific gravity. Chemical Examination: includes protein, glucose, ketone bodies, bile derivatives (bile salt, bile pigment, and Urobilinogen) and blood. These are examined by reagent strips or manually by using the heat acetic acid method for protein, Benedict's method for glucose, Rothera's test for ketones, Hay's test for sulfur powder, Ehrlich's test for urea, Fouchet's test for bilirubin, and the benzidine test. For the estimation of blood, chemicals were used for the chemical analysis of urine. Microscopic Examination: This is done in the following steps: -

1. Sample collection of urine for microscopic examination: The first morning urine sample is the best specimen due to its good concentration and preservation of WBC's, RBC's, and casts. For the microscopic examination of urine specimens, they are examined fresh or within one to two hours of the collection.

2. Sediment Preparation: It can be prepared by taking 5–10 ml of urine in a tube and centrifuging at 3000 rpm for 5 minutes, then discarding the supernatant, mixing well the left sediment, and placing a drop of this on a clean glass slide. After that, place a coverslip over it and examine it microscopically.

3. Examination: We examined the sediment looking for the following:

a. Cells (WBC's, RBC's, and epithelial cells).
b. Casts
c. Crystals
d. Bacteria, fungus, spermatozoa, etc.

Results: When we examined more than 300 urine samples of the known kidney patient, physically, chemically, and microscopically, the following data were obtained:

Physical Examination Results:-

Color		Appearance		Specific Gravity	pH		Deposit
Pale yellow-	64%	Clear-	33%	1.005-1.030	Acidic-	94%	Absent
Dark yellow-	20%	Turbid-	66%		Basic	6%	
Straw-	12%						
Radish-	4%						

Chemical Examination Result:

Albumin		Sugar		Ketone Bodies	Bile Salt	Bile Pigment
Nil	30%	Nil	80%	Absent	Absent	Absent
Trace	4%	Trace	4%			
+	40%	+	6%			
++	16%	++	6%			

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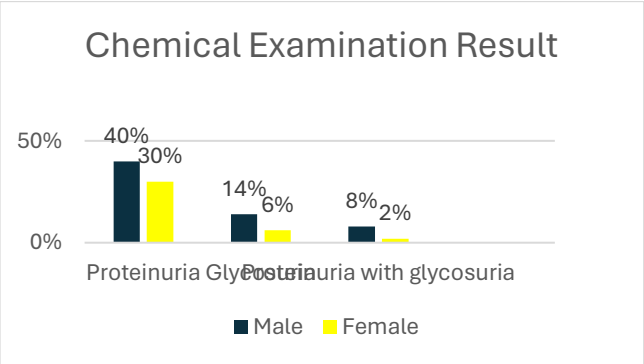
+++	10%	+++	4%

10% patient had Proteinuria with Glycosuria.*

Microscopic Examination Result:

Pus Cells		Epithelial Cells		RBC's		Cast	Crystals		Bacteria
1-10	58%	0-2	46%	Nil	30%	Few Fine	Nil	72%	Absent
10-20	24%	2-4	20%	0-2	30%	Granular	AU	6%	
20-30	8%	4-8	28%	2-6	16%	cast	CaO	12%	
30-40	8%	10-15	4%	6-10	8%	present in	UA	8%	
60-70	2%	20-25	2%	10-20	2%	1% people	TrP	2%	
				20-40	4%				
				40-70	4%				
				Full Field	6%				

AU= Amorphous urate, CaO = Calcium Oxalate, UA= Uric Acid and TrP = Triple Phosphate



Discussion:

In this research study, we found urine tests to be effective test for the diagnosis of kidney diseases and also found that some patients suffering from kidney disease are also suffering from diabetes along with kidney disease, This result indicate that there is a relationship between diabetes and kidney disease.

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References:

1. World Health Organization: Preventing Chronic Disease: A Vital Investment. Geneva, WHO, 2005.
2. Grassmann A, Gioberge S, Moeller S, et al: ESRD patients in 2004: global overview of patient numbers, treatment modalities and associated trends. Nephrol Dial Transplant 2005; 20: 2587–2593.
3. Center for Disease Control and Prevention (CDC): Prevalence of chronic kidney disease and associated risk factors – United States, 1999–2004. MMWR Morb Mortal Wkly Rep 2004; 56: 161–165.
4. Carlson DA, Statland BE. Automated urinalysis. Clin Lab Med 1988;8:449–61.
5. Ferris JA. Comparison and standardization of the urine microscopic examination. Lab Med 1983;14:659–62.
6. Winkel P, Statland BE, Jorgensen K. Urine microscopy: an ill defined method examined by a multifactorial technique. Clin Chem 1974;20: 436–9.

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7. Gadeholt H. Quantitative estimation of urinary sediment with special regard to sources of error. Br Med J 1964;1:1547–9.
8. Fogazzi GB, Garigali G. The clinical art and science of urine microscopy. Curr Opin Nephrol Hypertens. 2003;12(6):625-632.
9. Verdesca S, Brambilla C, Garigali G, Croci MD, Messa P, Fogazzi GB. How a skillful and motivated urinary sediment examination can save the kidneys. Nephrol Dial Transplant. 2007; 22(6):1778-1781.
10. Luciano RL, Perazella MA. Crystalline-induced kidney disease: a case for urine microscopy. Clin Kidney J. 2014;82(12): 387-391.