

Significance and Utilities of Routine Urine Analysis by Screening to Detect the Underlying Diseases

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Abstract: Renal diseases may be discovered accidentally during routine urinalysis. This study was done to find out the significance of urinalysis and study the magnitude of abnormal urinalysis in healthy adults with no symptoms of renal disease. In our set up routine urine analysis should be performed in all subjects to identify the presence of unrecognized renal disease which may benefit from simple therapeutic measures. Because of simplicity, routine urine analysis is the best way in early detection of most frequent conditions like proteinuria, haematuria, pyuria and glycosuria. This is useful in selecting asymptomatic patients with renal disease who may benefit from early treatment or who requires long term follow up. **Material and Methods:** Healthy subjects between age group of 20 and 55 years of age were screened for routine urine analysis in rural health area by conducting health camp periodically during from May 2012 to April 2013. A total of 1000 fresh morning samples of urine of the subjects attending routine health check up were collected and analyzed by Dipstick method with the help of pathology and health personnel staff. **Results:** There were 650 males and 350 females. The age ranged from 20 to 55 years. We found urine abnormalities in total 19.7% cases. Proteinuria was present in 2.6% (26 subjects), hematuria in 5.2% (52 subjects), pyuria in 9.9% (99 subjects) and glycosuria in 2% (20 subjects). The study concludes that in our setup routine urine analysis should be performed in all healthy subjects to identify the presence of unrecognized renal diseases which may benefit from simple therapeutic measures. The urinalysis is a frequently used tool in primary care, and abnormal finding is a step to monitor and evaluation of the cause of the disease.

Keywords: Urine, Urinalysis, Proteinuria, Hematuria, Glycosuria, Pyuria.

1. Introduction

Routine urine screening programs are recommended as a basic fundamental step in early identification of renal damage. Urinary diseases are a growing health problem. Urinary tract diseases are often accidentally diagnosed in asymptomatic subjects e.g. Glycosuria, Proteinuria in pregnancy, painless hematuria etc. An abnormal urine test may be the earliest warning of a significant renal disease. Because of its simplicity, routine urine analysis is the best way in early detection of most frequent conditions like proteinuria, hematuria or glycosuria at a very low cost. This is useful in selecting asymptomatic patients with renal diseases who may benefit from early treatment, counseling or who require long term follow up. This study was done to see the value of routine urine analysis and study the magnitude of abnormal urinalysis in patients with no symptoms of urinary tract disease.

2. Aims and Objectives

1. General health screening to detect renal and metabolic diseases.
2. To identify the underlying cause of the disease and to put the therapeutic measures of it.
3. Prevention of the common diseases like D.M., Hypertension, Renal calculus etc.
4. Early diagnosis of silent renal disorders.
5. Implementation of easier and cost effective test even at school health check up.

3. Material and Methods

This cross sectional study was done on routine health check up programme during the year- 2012-13 conducted in rural health area on community based screening quarterly in a

year in a three different district places. A total of 1000 samples of urine were collected. Patients with known renal disease and pregnant females were excluded. A clean catch mid stream urine specimen was obtained in sterile containers. A dipstick method (Multistix, Bayer) was used for urine testing. A rapid urine test is the quickest way of examining urine.

3.1 Specimen Requirements

- Random fresh urine sample. The first voided morning specimen is the most suitable for urinalysis because it is concentrated and is less likely to lyse or distort the formed elements.
- Minimum volume is 0.5 ml.
- Test within two hours of collection.
- If unable to test within two hours, the sample is stable refrigerated at 2-4°C for twelve hours. Specimens were returned to room temperature before testing. A test strip is dipped into the urine and then compared with the colour fields on the packaging.

4. Observations and Results

The results of the study are shown in Table 1.

Table 1: Distribution of abnormal urinalysis by sex and age groups

Age Group	Sex	No. of Patients	Protien (Albuminuria)	R.B.C. (Hematuria)	Pus Cells (Pyuria)	Glucose (Glycosuria)
20 to 25	M	64	NIL	06	04	NIL
	F	40	NIL	02	06	NIL
26 to 30	M	68	NIL	04	06	NIL
	F	50	04	02	08	NIL
31 to 35	M	66	NIL	04	04	02
	F	100	02	02	03	NIL
36 to 40	M	79	02	06	06	02
	F	65	04	NIL	10	04
41 to 45	M	102	NIL	06	06	04
	F	78	02	04	12	02
46 to 50	M	74	02	04	10	02
	F	78	04	NIL	12	02
51 to 55	M	79	04	04	04	NIL
	F	57	02	08	08	02
Total		1000	26	52	99	20

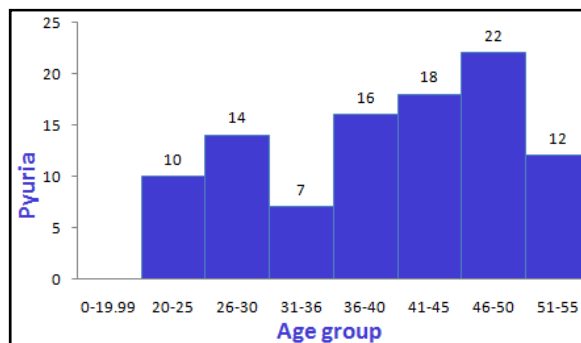


Figure 5: Showing pyuria in different age groups.

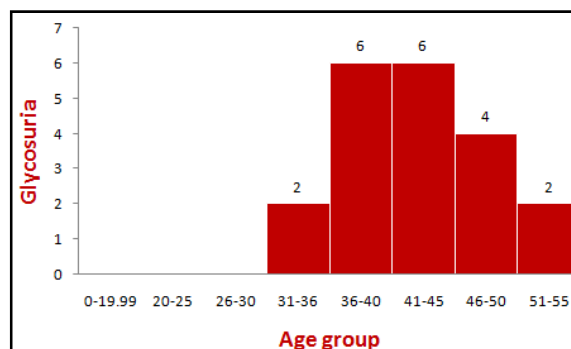


Figure 6: Showing glycosuria in different age groups

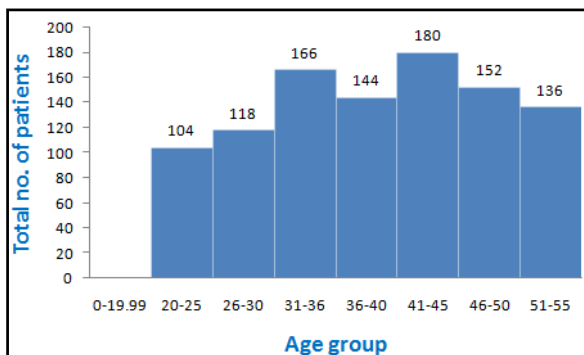


Figure 2: Showing total no. patients in different age groups.

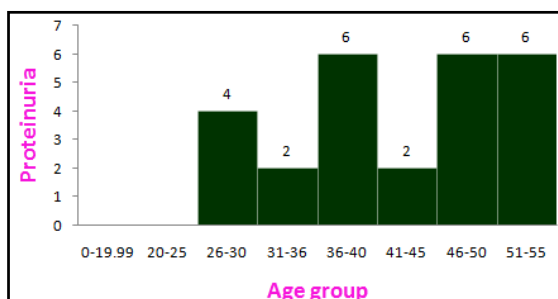


Figure 3: Showing proteinuria different age groups

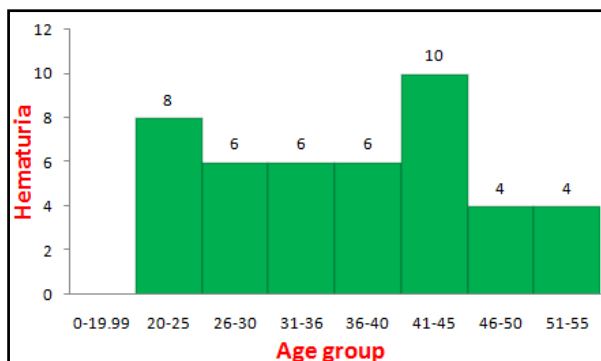


Figure 4: Showing hematuria in different age groups.

Total 1000 urine samples were screened in the study period. There were 650 males and 350 females (Fig. 2). We have detected proteinuria 2.6% (Fig. 3), hematuria 5.2% (Fig. 4), pyuria 9.9% (Fig. 5) and glycosuria 2% (Fig. 6) in the age ranged from 20 to 55 years. Abnormal urine findings are shown in Table-1. Pyuria was seen more in females than in males. Glycosuria was seen more in patients above 40 years of age. Painless hematuria was found in 24 patients and more common in males.

5. Discussion

Urine testing has been a part of medicine for many centuries, with Hippocrates having written about urine examination as early as 400 B C Bolodeoku J et al[2] (1996) and Liao JC [2] (2001). Early detection and treatment can often prevent serious diseases from getting worse. Laboratory testing is essential to monitor renal health in elderly people. In health, the urine contains small numbers of cells and other formed elements from the whole length of the genitourinary tract; casts and epithelial cells from the nephron; epithelial cells from the pelvis, ureters, bladder and urethra; mucous threads and spermatozoa from the prostate. A few erythrocytes and leukocytes apparently reach the urine by diapedesis from any part of the urinary tract. Urine analysis is a group of manual and/or automated qualitative and semi-quantitative tests performed on a urine sample. A routine urine analysis usually includes the following tests: color, transparency, specific gravity, pH, protein, glucose, ketones, blood, bilirubin, nitrite, urobilinogen, and leukocyte esterase. It is customary to perform the microscopic examination. The dipstick analysis (\pm microscopy) is the most common form of urine analysis, and has recently been evaluated as the most cost-effective screen for UTI in young infants Shaw KNMcGowan [11] (1998).

A number of studies have demonstrated the usefulness of dipstick in screening asymptomatic patients. Urine dipstick is sensitive for detection of proteins, blood and pus cells. Carl et al [3] (1987) screened 2100 healthy adults by dipstick method and found that 10% adults had at least one urine abnormality detected. Because of its simplicity, a general practitioner or a nurse can carry it out. This would reduce the workload on the laboratories. The results of this study are comparable to some other studies. Oviyasu et al [9] (1994) reported that routine urinalysis of asymptomatic adolescents in Nigeria detected proteinuria in 4.7% and hematuria in 0.55% adolescents. However in a study of urinalysis in primary health care centers in Saudi Arabia, Al-Homrany[1] (1997) and his colleagues found that proteinuria was present in 11.7% patients, hematuria in 11% patients, glycosuria in 4.7% patients and leucocytes in 10.6% patients. This appears significantly higher than this study. So this significant prevalence of urinary tract abnormalities justifies routine urinalysis of patients in primary health care centers.

Healthy adults normally excrete 80-150 mg protein in urine daily. Normal urinary proteins include serum globulins, albumin, and proteins secreted by the nephron. Detectable proteinuria may be first sign of renovascular, glomerular or tubulo-interstitial renal disease. Alternatively, it may be caused by overflow of abnormal proteins in diseases such as multiple myeloma. Persistent significant proteinuria detected by dipstick requires further assessment with 24-hour urinary protein excretion, urinary protein-creatinine ratio, microscopic examination of the urinary sediment, urinary protein electrophoresis, and assessment of renal function, Carroll MF and Temte JL [4] (2000). The presence of proteinuria is 2.6% in this study. Proteinuria is a strong independent predictor and risk factor of End Stage Renal Disease. Therefore asymptomatic proteinuria warrants further work up and intervention to reduce the incidence of End Stage Renal Disease. A common cause of proteinuria in asymptomatic patients is orthostatic proteinuria. Sometimes having trace amount of protein is considered normal. Repeat the test after several hours. If still having the same result, then it requires further investigations to rule out the diseases.

Dipstick testing for hematuria is a best a screening tool which needs the support of microscopy to make a definitive diagnosis, Rao PK and Jones JS [10] (2008). Asymptomatic hematuria occurs in 10% of men and 20% of women which was almost twice than our study. At early stages of a kidney disease, people usually are asymptomatic. Following are the common symptoms of kidney dysfunctions anorexia, loss of body weight, oliguria, burning micturition, nausea and vomiting, lethargy, edema of face and feet, numbness, muscle cramps and drowsiness. The detection of proteinuria and/or hematuria is useful in selecting patients who require long-term surveillance.

Nearly all glucose filtered by the glomeruli is reabsorbed in the proximal tubules and only undetectable amounts appear in urine in healthy patients. Above renal threshold (180mg/dL) glucose will appear in urine, Text Book of Medical Physiology, Guyton & Hall [5], 11th edition. Test relies upon reaction of glucose with glucose oxidase on dipstick to form hydrogen peroxide which causes colour change. This is specific to glucose and no other sugar,

McPherson RA, et al [8]. We detected presence of glucose in urine in 2% of cases. So, accidentally diabetes mellitus is detected on urine testing.

Pyuria was detected 9.9% in this study which is comparatively more common in females than males. It is generally recommended, however, that asymptomatic bacteriuria not be treated because it has not been shown to have benefit and may increase the risk for pyelonephritis, Kemper KJ, Avner ED[7] (1992). Yamagata K, et al [12] (2008), found pyuria in 64.5% females and 35.5% males. This also supports the findings of other studies where pyuria is seen more in females.

Urine analysis by dipstick method is the first step to diagnose the chronic kidney disease in asymptomatic subjects. Chronic kidney disease is a worldwide public health problem, with increasing prevalence and adverse outcomes, including progressive loss of kidney function, cardiovascular disease, and premature death. Disturbances in mineral metabolism and bone disease are common complications of chronic kidney disease and an important cause of morbidity and decreased quality of life, Iseki K, Iseki C, Ikemiya Y, et al [6] (1996). Importantly, there is increasing evidence suggesting that these disorders in mineral and bone metabolism are associated with increased risk for cardiovascular calcification, morbidity, and mortality.

6. Conclusion

This study shows the effectiveness of screening urinalysis programme to identify patients with asymptomatic renal diseases for further evaluation and disease modifying intervention. Urine microscopy should be performed on any patient who has persistent hematuria or proteinuria and may be useful if the urine dipstick is suggestive of UTI. Moreover the public should be educated in order to have health check for asymptomatic renal disease. Quantitative urinalysis tests may be performed for diagnosis of many specific disorders, such as endocrine diseases, bladder cancer, osteoporosis, and porphyrias. Mineral and bone disorders are complex abnormalities that cause morbidity and decreased quality of life in patients with chronic kidney disease.

References

- [1] Al-Homrany M, Mirdad S, Al-Harbi N, Mahfouz A, Al-Amari O, Abdalla. Utility of urinalysis in patients attending primary health care centers. Saudi J Kid Disease Transplant 1997; 8: 419-22.
- [2] Bolodeoku J, Donaldson D. Urinalysis in clinical diagnosis. J Clin Pathol 1996; 49(8):623-6.
- [3] Carl RS, Silverberg DS, Kaminsky R, Aviram A. Routine urinalysis (dipstick) findings in mass screening of health adults. Clin chem. 1987; 33: 2106-8.
- [4] Carroll MF, Temte JL; Proteinuria in adults: a diagnostic approach. Am Fam Physician, 2000 Sep 15; 62(6):1333-40.
- [5] Guyton and Hall, Text book of medical physiology, 11th edition. Liao JC, Churchill BM. Pediatric urine testing. Pediatric Clinical North Am 2001; 48(6):1425-40.

- [6] Iseki K, Iseki C, Ikemiya Y, et al. Risk of developing end-stage renal disease in a cohort of mass screening. *Kidney Int.* 1996; 49:800–805.
- [7] Kemper KJ, Avner ED. The case against screening urinalyses for asymptomatic bacteriuria in children. *Am J Dis Child* 1992; 146(3):343– 6.
- [8] McPherson RA, et al. *Henry's Clinical Diagnosis and Management by Laboratory Methods.* 22nd ed. Philadelphia, Pa.: Saunders Elsevier; 2011.
- [9] Oviasu e, Oviasu SV. Urinary abnormalities in asymptomatic adolescent Nigerians. *West Afr J Med* 1994; 13:152-5.
- [10] Rao PK, Jones JS; How to evaluate 'dipstick hematuria': what to do before you refer. *Cleve Clin J Med.* 2008 Mar; 75 (3):227-33.
- [11] Shaw KN, McGowan KL, Gorelick MH, Schwartz JS. Screening for urinary tract infection in infants in the emergency department: which test is best? *Pediatrics.* 1998; 101E1
- [12] Yamagata K, Iseki K, Nitta K, et al. Chronic kidney disease perspectives in Japan and the importance of urinalysis screening. *Clin Exp Nephrol.* 2008; 12:1–8.

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