



Original Article

Urine Analysis for Abnormal Urine in Pathology Laboratory

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Abstract

Aims and Objective: *Urinalysis is routine screening tests and diagnostic tool for identification of infections and diseases. The objective is to the evaluation of the frequency of abnormal urine and use of tests for confirming the provisional clinical diagnosis.*

Material and Methods: *This prospective study was conducted in pathology laboratory of district hospital associated with government medical college, Khandwa during 4-months period between 1 April 2019 -30 July 2019. Age involved upto 80 years. Total 5400 urine samples received in Laboratory. Patients were recorded in proforma, clinical history and urine reports. 30 ml urine is required for analysis with requisition form. They were examined for proteins, glucose, ketones, bilirubin, blood using 10 parameters urine test strips and cells, cast, crystals microscopy using light microscope.*

Results: *Our study involved patients upto 80 years of age. Maximum number of samples 63.3 % were obtained from females. The occurrence of pregnant women was 5.4 % and urinary tract infection in pregnant women was 9.2 %. The abnormal findings in this study was 31.4 %. The abnormal physical findings were dark urine 30.7 % and hazy urine 17.4 %. In this study proteinuria was 16.2 %, glycosuria was 5.3 %, ketones in urine was 2.6 %, positive bilirubin in urine was 0.03%, pyuria was 18.6 %, haematuria was 12.5 % and bacteriuria was 6.8 %.*

Conclusion: *This urine analysis study will be helpful to provide informations of patient's health to clinician for investigation and management of diseases.*

Keywords: *Routine investigations, Reagent strips, Microscopy.*

Introduction

Chemical constituents frequently tested in urine are proteins, glucose, ketones, blood, bilirubin and bile derivatives.⁽¹⁾ Proteins found in urine in pathological conditions including the plasma proteins, albumin, globulin and fibrinogen.⁽²⁾ Bromophenol coated strip is dipped in urine and observe the colour change of strip which indicates presence of protein in urine. Colour change is compared with the colour chart on the bottle, it gives semi quantitative grading of proteinuria. Causes of proteinuria are nephrotic syndrome, diabetes mellitus, hypertension, urinary tract infections, fever, polycystic kidney.⁽¹⁾

Normally 130 mg glucose per 24 hr is passed in urine which is undetectable by routine urine tests. These strips are coated with glucose oxidase and test is based on enzymatic reaction. The strips is dipped in urine for 10 seconds and observe the change in colour. The colour change is matched with standard colour chart on reagent strip bottle. Causes of glycosuria are diabetes mellitus, endocrine causes, severe burns, severe sepsis and pregnancy.⁽¹⁾

Red blood cells are present in fresh urine specimen is called hematuria. It is examined both macroscopically and microscopically.⁽²⁾ Microscopic hematuria is clinically significant when 10 red blood cells per high power field are seen. The reagent strip is coated with orthotoluidine. Dip the strip in urine and observe the colour change. If blood is present, it changes to blue colour. Causes of hematuria are renal stones, renal tumours, polycystic kidney, bleeding disorders and trauma.⁽¹⁾

Ketone bodies are present in urine due to incomplete fat metabolism. Ketone bodies are acetoacetic acid, acetone and b-hydroxybutyric acid which excreted in urine. These strips are coated with alkaline sodium nitroprusside. When strip is dipped in urine, colour change to purple if ketone bodies are present. Causes of ketonuria are diabetic ketoacidosis, fever, dehydration, hyperemesis gravidarum, and cachexia.⁽¹⁾

Bilirubin is breakdown product of haemoglobin. Normally no bilirubin is passed in urine. Reagent strip test-It is based on coupling reaction of bilirubin with diazonium salt coated. Dip the strip in urine, if bilirubin is present, it changes to blue colour. Detection of bilirubin in urine is helpful in the differential diagnosis of jaundice.⁽¹⁾

Microscopic examination of urine is called the liquid biopsy of the urinary tract. The cellular elements are preserved in acid hypertonic urine.⁽³⁾ Leukocytes less than 10 per cu.mm may occur in normal urine. Increased number of leukocytes called pyuria which indicate the presence of inflammatory disease of urinary tract.⁽²⁾

Sign and symptoms of urinary tract infection were burning pain, dark urine, fishy smell and urinary urgency. It was observed protein, glucose, ketone bodies, bilirubin, blood, more than 10 leukocytes per field, more than 3 red blood cells per field.⁽⁴⁾

Evaluation of the frequency of abnormal urine and use of tests for confirming the provisional clinical diagnosis.

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Material and Methods

This prospective study was conducted in pathology laboratory of district hospital associated with government medical college, Khandwa during 4-months period between 1 April 2019 to 30 July. Age involved upto 80 years. Total 5400 urine samples received in Laboratory. Patients were recorded in proforma, clinical history and urine reports. 30 ml urine is required for analysis with requisition form. Midstream urine is collected to reduce contamination of sample. They

were examined for proteins, glucose, ketones, bilirubin, blood using 10 parameters urine test strips and cells, cast, crystals microscopy using light microscope.

Take fresh midstream 10 ml urine sample in sterile container and analyse within 2 hours of collection. After centrifuge on 1500 rpm for 5 minutes pour off supernatant fluid, leaving the Deposites undisturbed at the bottom of tube. Mix the sediment and urine. Place 1 drop on slide and cover with cover slip. Examine under microscope at 10X and 40X power view.

Urine HCG test were recommended for pregnancies. We analysed urine by visual examination, reagent strips and microscopy. It is noninvasive and repeated examination of urinary sediments.

Results

Our study involved patient’s upto 80 years of age. Maximum number of samples 63.3 % were obtained from females. The occurrence of pregnant women was 5.4 % and urinary tract infection in pregnant women was 9.2 %. The abnormal findings in this study was 31.4 %. The abnormal physical findings were dark urine 30.7 % and hazy urine 17.4 %. In this study proteinuria was 16.2 %, glycosuria was 5.3 %, ketones in urine was 2.6 %, positive bilirubin in urine was 0.03%, pyuria was 18.6 %, haematuria was 12.5 % and bacteriuria was 6.8 %.

Table 1: Age and gender distribution of the participants

Age group (in years)	Male (%)	Female (%)	Total (%)
0-10	2.1	5.3	7.4
11-20	10.6	16.6	27.2
21-40	14.3	23.7	38
41-60	6.7	9.5	16.2
61-80	3.0	8.2	11.2
Total	36.7	63.3	100

Table 2: Urine examinations of the participants

Physical examination	Dark urine	30.7 %
	Hazy urine	17.4 %
Chemical examination	Proteinuria	16.2 %
	Glycosuria	5.3 %
	Ketones	2.6 %
	Bilirubin	0.03 %
Microscopy	Pyuria	18.6 %
	Hematuria	12.5 %
	Bacteriuria	6.8 %

Discussions

Urinalysis using a reagent test strip is a quick and simple method of assessing renal function. Our study involved patients upto 80 years of age. The most common age group was 21-40 years. Maximum number of samples (63.3%) were obtained from females patients with more positive results than males. It’s due to test requests for antenatal protocol. Higher susceptibility to infections is due to short urethra, closer proximity to anus and vagina. (4)

The abnormal findings in this study was 31.4 % which is similar to the study of shahina et al (5) reported abnormal findings was 39.8 %.(5) The old age group with minimum number of patients had maximum positive percentage. The lowest percentage of positive tests in children were found due to difficulty in obtaining adequate sample in children.

The abnormal physical findings are dark urine 30.7 %, which were similar to the study of Danielle et al (4) reported 42.2%. Dark urine may indicate dehydration, Cloudiness or debris can indicate the presence of pus, protein or white cells and require further investigation.

Proteinuria was seen in 16.2 % which was similar to the study of shahina et al (5) reported 7.1%. Proteinuria can occur after exercise, in highly concentrated urine, fever, severe emotional stress in healthy persons.

Glycosuria was seen in 5.3 % which was similar to the study of shahina et al (5) reported glycosuria 7.8 %. The presence of glucose in the urine may be indicative of diabetes mellitus but can also

occur during pregnancy, physiological stress and in those taking corticosteroids.

Ketones are present in urine was 2.6 %, fruity smell indicate the presence of ketones in the urine. Ketones are acidic chemicals that are formed during the abnormal excessive breakdown of fat. It occur as result of prolonged vomiting, fasting, starvation and poorly controlled diabetes mellitus. The bilirubin in urine present in 0.03 % which was similar to the study of Kevin et al⁽⁷⁾ reported positive bilirubin finding was 0.3%. The presence of bilirubin may indicate liver disease or biliary obstruction.

The prevalence of pyuria was found 18.6 % which is similar to the study of shahina et al⁽⁵⁾ reported pyuria 25.8 %. A 'fishy' smell indicate an infection.

Hematuria was seen in 12.5 % which is similar to the study of shahina et al⁽⁵⁾ reported hematuria 18.35 %. The presence of blood in urine is abnormal and is associated with problems in the urinary tract, such as cancers, renal damage or stones. Transient microscopic hematuria can be caused by vigorous physical exercise, sexual intercourse, trauma, rectal prostate examination and menstrual contamination.⁽⁶⁾

The occurrence of pregnant women was 5.4 % and urinary tract infection in pregnant women was 9.2 % which was similar to the study of Danielle et al⁽⁴⁾ reported 6.7 % pregnant women and prevalence of UTI in pregnant women was 10 %⁽⁴⁾

Conclusion

Quantitative urine test strip analysis provides data on protein, glucose, leucocytes, ketones and Rbcs. This urine analysis study will be helpful to provide informations of patient's health to clinician for investigation and management of diseases, e.g. urinary tract infections, diabetes mellitus, renal disease, liver diseases, metabolic disorder, hemorrhagic conditions, presence of stones, trauma and malignancy. Urinalysis can be used for screening of substances present in urine e.g. Proteins, glucose, leucocytes, ketones and

blood. Pyuria was the commonest abnormality, especially in females.

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