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Original Article

Urine Analysis of Glycosuric Patients

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ABSTRACT

We investigated the presence of proteinuria by urine dipstick for glomerular disease and microscopic examination of pus cells for asymptomatic pyuria or urinary tract infection. Study was conducted at Outpatient departmental laboratory of Pathology Department at P.D.U. Medical College & Hospital, Rajkot on 400 glycosuric patient's urine samples. Out of them 192 samples were positive for both protein and pus cells while 53 samples were positive for only protein & 34 samples having only microscopic pus cells seen. So risk of developing glomerular disease and urinary tract infection coexisting in glycosuric patients is approximately 48%, only glomerular disease or asymptomatic proteinuria is approximately 13.25% & only asymptomatic pyuria or urinary tract infection is approximately 8.5%. Glycosuria leads to disturbance of kidney function and increasing risk of urinary tract infection. Our result shows there are increased chances of progression to glomerular disease and susceptibility to urinary tract infection in patients having glycosuria.

INTRODUCTION

The urine analysis is one of the most commonly desired clinical tests in pediatrics and elderly age group patients. This high frequency of test is partly due to the ease of urine collection and testing. Since glycosuria is often found easily on routine examination of the urine, the importance of this simple procedure in every case is obvious. When a reducing substance is found in the urine, it is necessary to confirm it as glucose. Advances in chemistry allowed significant progress in urine testing methods during the nineteenth century, and the modern era of reagent strip (dipstick) testing began in 1956[1]. Evidence of kidney damage is usually indicated by albuminuria or proteinuria[2-5] and pyuria associated with urinary tract infection by microscopic examination of inflammatory cells or by leukocyte esterase produced by neutrophils & nitrites by urine dipstick test. Measuring albumin level to detect chronic kidney disease is already recommended for individuals with diabetes mellitus because they may be missed in a small number of individuals. Dipstick testing of urine with protein or albumin reagent strips has been established in clinical practice and has often been recommended for early detection of chronic kidney disease in patients who have diabetes or glycosuria.

Urine dipstick analysis is used to screen asymptomatic patients and to test for specific indications[6]. The appearance of glucose in the urine may reflect high plasma glucose, resulting in a glucose load in the filtrate that exceeds the proximal tubule's ability to reabsorb glucose. Typically, glucose does not appear in the urine until the plasma level exceeds 180 to 200 mg/dL. Alternatively, glycosuria may reflect a defect in the proximal tubule cells' ability to

reabsorb a normal filtered glucose load. When this defect is an isolated one, it is termed as renal glycosuria.

Under normal circumstances, low molecular weight proteins and a small amount of albumin are filtered through the glomerular capillary wall. As a result, up to 150 mg/d (in adults) or 4 mg/m²/hr (in children) of protein in the urine is considered to be within normal limits. In glomerular disease, the primary protein excreted is albumin, whereas in tubular disease, low molecular weight proteins[7]. The presence of increased protein in the urine can signify underlying renal disease, although there are a number of false positives/negatives. A common cause of proteinuria in asymptomatic patients is orthostatic proteinuria, a benign diagnosis, which should be ruled out using a first morning void specimen before pursuing further evaluation.

Microscopic examination of the urine primarily consists of examining the urine for the presence of cells, casts, crystals, and bacteria. Urine microscopy should be performed on any patient who has persistent glycosuria, hematuria or proteinuria and may be useful if the urine dipstick is suggestive of UTI. Pyuria usually signifies UTI, although it is not specific for UTI[8]. Other conditions that can result in pyuria include fever, glomerulonephritis, and other inflammatory processes, whether in the bladder or pelvic region (eg, appendicitis). The presence of pyuria does not add to and may not be as good a screen for UTI as LE and nitrites from the urine dipstick[9]; the urine should still be cultured to confirm UTI. White blood cells from the vagina can contaminate urine specimens and give a false positive reading.

MATERIALS AND METHODS

This was a cross-sectional study done on routine urine samples over a period of one month duration in May 2014. Written informed consent was taken from all patients and the study was approved by Institute's Ethical Clearance Committee. All samples collected were midstream urine voiding and collected in a clean sterile container and examined within 30 minutes. Samples were not stored longer than 1 hour and not been admixture with any preservatives. The samples were first screened by dipstick test. Those samples which are positive for sugar (+1 or more) on dipstick test were tested further and included in our study. The sample size thus comprised of 400 samples. These samples are further examined for dipstick test of protein (suggesting glomerular disease) and microscopic examination. For microscopic examination approximately 10 ml of urine sample was centrifuged for 10 minutes at 2000 rpm, the supernatant decanted and the remaining sediment examined on a glass slide at low power and then high power to check for pus cells. Greater than 5 pus cells per high power field (hpf) was considered as abnormal (positive for pus cells). The results were then analyzed with SPSS version 17 software (IBM).

RESULTS

Out of 400 glycosuric patient's urine samples 192 samples were positive for both proteins by urine dipstick and pus cells by microscopic examination while 53 samples were only positive for protein & 34 samples having only microscopic pus cells seen giving evidence of asymptomatic pyuria or urinary tract infection. So risk of developing glomerular disease and urinary tract infection coexisting in glycosuric patients is approximately 48 %, only glomerular disease or asymptomatic proteinuria in approx 13.25 % & only asymptomatic pyuria or urinary tract infection is approx 8.5 %.

DISCUSSION

There are doubts about the presence of glycosuria and the progress of glomerular disease and UTI. Some reports suggest that glycosuria could be an index of a more severe tubulointerstitial lesion and provide adequate environment for bacterial growth. Since glycosuria is often found easily on routine examination of the urine, the importance of this simple procedure in every case is obvious. Unless this symptom is severe or long-standing, many of these patients make no suggestive complaint when first seen.

The urinalysis is a frequently used tool in primary care, and abnormal findings are common. The utility of mass urinalysis

screening remains to be determined. Urine dipstick analysis remains one of the few tests commonly performed as a primary investigation. It is used to screen asymptomatic patients and to test for specific indications. Likewise, abnormal findings are sometimes expected and sometimes incidental. It must be remembered that not all abnormal results are clinically significant. Abnormal results can result from pathologic or nonpathologic causes. In addition, false positive and false negative results are common. (See table 1.)

Our data analysis shows out of 400 glycosuric patient's urine samples 192 samples were positive for both proteins by urine dipstick test and pus cells by microscopic examination. This indicate presence of reducing substances in urine causes tubulointerstitial damage and provide appropriate adequate environment for bacterial growths and progress toward the UTI. So risk of developing glomerular disease and urinary tract infection coexisting in glycosuric patients is approximately 48 % as for our study. While 53 samples were only positive for protein & 34 samples having only microscopic pus cells seen giving evidence of asymptomatic pyuria or urinary tract infection, so the chances of developing only glomerular disease or asymptomatic proteinuria in approx 13.25 % & only asymptomatic pyuria or urinary tract infection is approx 8.5 % as for our study.

Finding of glycosuria in glomerular diseases with proteinuria may be related to some functional impairment of tubular cells and may indicate more intense tubulointerstitial changes and a poor prognosis in glomerular diseases[10].

CONCLUSION

Our result shows there are increased chances of progression to glomerular disease as evidenced by presence of protein in urine and susceptibility to urinary tract infection as evidenced by presence of pus cells in microscopic examination of urine in patients having glycosuria as compare to general public having kidney disease or diagnosed UTI by reference data available. Therefore its proved that glycosuria increase the morbidity and mortality among the diabetic patients or asymptomatic glycosuric patients.

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Table 1. Findings obtained on protein dipstick and microscopic examination in patients having glycosuria

Findings	Proteinuria & Pyuria	Only Proteinuria	Only pyuria	Negative for proteinuria & Pyuria	Total
Number of positive samples	192	53	34	121	400
Percentage of positivity (%)	48%	13.25%	8.5%	30.25%	100%