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Research Paper

Study of Evaluation of Causes and Lab Diagnosis of Hematuria in Adults At A Tertiary Care Centre In Jharkhand

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ABSTRACT
INTRODUCTION: *Hematuria is defined as the presence of an abnormal quantity of red blood cells (RBCs) in the urine. Clinically , it can be classified as either gross or microscopic hematuria. The detection rate of hematuria found on health screening is considerably high almost double or triple that of proteinuria. Diseases in adults that cause hematuria can broadly devided into three groups: systemic diseases involving the kidney, renal parenchymal disease, and urologic disease.* ***OBJECTIVE:*** *To provide a clinical framework for the diagnosis, evaluation and follow up of hematuria from records (August 2020 – July 2021) at Pathology department, MRMCH, Palamu.* ***METHOD: :*** *A record based study was conducted from August 2020 - July 2021. Data were collected from the records of Pathology department of MRMCH, Palamu, . Data regarding age, sex, screening test results for hematuria were collected from the records of Pathology department of MRMCH, Palamu.* ***RESULTS:*** *In the present study a total of 230 urine samples of hematuria were screened during the one year period from August 2020- July 2021. Out of them, 90 (39.13%) were of of hematuria of due to urinary tract infection (UTI), 52 (22.60%) were of hematuria of urolithiasis, 48 (20.86%) hematuria were of systemic diseases (diabetes mellitus and hypertension) , 25 (10.86%) hematuria of urologic tumour, 15 (6.5%) hematuria of due to glomerulonephritis.* ***CONCLUSION:*** *Hematuria is generally benign in younger patients with no risk factors, particularly women. However, older individuals, particularly men, should be evaluated for potentially serious urologic conditions such as malignancy.*
KEYWORDS: *Hematuria, Kidney, RBC, Urine, Screening*

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I. INTRODUCTION

Hematuria is the presence of RBCs (erythrocytes) in the urine. Hematuria can be broadly divided in two categories:

Macroscopic hematuria (i.e., grossly visible): This is considered as little as 1 ml of blood per litre of urine, which can induce a visible colour change [1]. It can be accompanied by the passage of blood clots, which usually indicate an origin an origin from the lower urinary tract or from renal tumours in which massive blood loss accumulates in the bladder.

Microscopic hematuria (i.e., detectable only on urine examination). Clinically significant Microscopic hematuria is defined as 3 or more RBCs as per high power field, corresponding to 10-12 erythrocytes per microliter to automated analysers[2], confirmed in 2 urinalysis test performed when there is no benign etiology such as menstruation, recent exercise, recent sexual activity, or recent instrumentation of the urinary tract[3].

The incidence of hematuria is about 10%, representing a clinical finding commonly encountered by primary care physian [3]. As a general principle , hematuria itself does not cause direct harm, with the exception of bleeding with clots blocking the ureter and causing obstructive acute kidney injury, or bleeding with clots blocking the urethra and causing acute urinay retension. Transient hematuria is common and almost always benign in young patients and a cause is often not identified. An important exception to the typically benign nature of transient hematuria occurs in patients over the age of 40 in whom transient hematuria carries an

increased risk of malignancy(assuming there is no evidence of glomerular bleeding[1]. Transient hematuria (micro or macro) in atheles and people who practice intense physical activity, after physical exercise. It is an isolated hematuria, but it also can be associated with proteinuria; although it probably reflects renal damage, but it can not be considered a sign of disease. Diseases in adults that cause hematuria can broadly devided into three groups: systemic diseases involving the kidney, renal parenchymal disease, and urologic diseases. Systemic diseases causing damage to the kidney include hypertension, diabetes mellitus, and many other diseases. Important renal parenchymal diseases are glomerulonephritis and its related diseases. Urologic diseases includes malignant tumour, urolithiasis and urinary tract infection. Congenital urinary tract malformation and hereditary nephritis are clinically important. Therefore it is important to develop effective strategies for diagnosing the cause of hematuria. Renal diseases that cause hematuria are chronic glomeruloneohritis, persistant hematuria/ proteinuria syndrome, alports syndrome, thin basement membrane disease.

II. METHOD

The present study was conducted from August 2020 – July 2021 through records at Pathology Department of MRMCH , Palamu. In the Pathology department each urine sample was screened for Microscopic hematuria and Macroscopic hematuria. Data were collected from the records of the Pathology Department of MRMCH, Palamu for the duration of August 2020- July 2021. Data regarding all urine sample screened for hematuria were recorded. Data regarding age, sex , and screening test results were collected from the records. After data collection assessment and analysis was done for urine sample screened for hematuria.

III. RESULTS

In the present study a total of 230 urine samples of hematuria were screened during the one year period from August 2020- July 2021. Out of them, 90 (39.13%) were of of hematuria of due to urinary tract infection (UTI), 52 (22.60%) were of hematuria of urolithiasis, 48 (20.86%) hematuria were of systemic diseases (diabetes mellitus and hypertension) , 25 (10.86%) hematuria of urologic tumour, 15 (6.5%) hematuria of due to glomerulonephritis. This study shows that most common causes of hematuria in adults are UTI and least common causes of hematuria in adults are glomeruloniphritis.

IV. DISCUSSION

Significant microscopic hematuria is defined as 3 or more RBC/hpf (≥ 3 RBC/hpf) on urine microscopy.

Positive dipstick for hemoglobinuria requires confirmation with urine microscopy testing.

Insignificant microscopic hematuria (0-2 RBC/hpf) does not require further investigation.

Urine microscopy should be collected at the laboratory as the sample must be analysed within 2-3 hours.

Urine cytology is no longer recommended for routine workup of asymptomatic microscopic hematuria.[4]

A single positive urine microscopy (≥ 3 RBC/hpf) should initiate workup as microscopic hematuria is known to be highly intermittent, even in the setting of significant underlying pathology.[4]

Significant microscopic hematuria (≥ 3 RBC/hpf) should be investigated with renal function testing (urine albumin-to creatinine ratio (ACR), creatinine/eGFR), blood pressure, imaging.

The first line recommended imaging test in most circumstances for the investigation of significant microscopic hematuria is kidney/bladder ultrasound.

Cystoscopy is recommended for patients with significant microscopic hematuria over the age of 40 or at any age for those with risk factors (Male gender , smoking, occupational exposure of dyes or chemical, overuse of analgesic drugs, exposure of pelvic radiation) for urologic malignancy or abnormality.[5,6]

Following a negative workup, urine microscopy, renal function (urine ACR, creatinine/eGFR), blood pressure and urine cytology (if risk factors for urothelial cancer{Male gender , smoking, occupational exposure of dyes or chemical, overuse of analgesic drugs, exposure of pelvic radiation} are present) should be followed annually (follow-up can be discontinued after 3 years of negative testing).[5]

Indications for repeat investigation:

- Repeat investigation should be undertaken for gross hematuria, new urinary symptoms, or increasing degree of microscopic hematuria, proteinuria, or declining renal function.
- Consideration should be given to repeat investigation if microscopic hematuria persists 3-5 years after initial workup.[5]

Screening the general population for microscopic hematuria is not currently recommended.

Urinalysis performed as part of a health screening usually employs a paper strip test. Therefore, when the test has indicated hematuria, it is necessary to carry out microscopic observation of urinary sediments to determine the severity of hematuria. It is also important to look for irregularities in the size and shape of RBCs,

and the presence of white blood cells and casts in urine. In addition, the following examinations should be performed: a general physical examination; blood pressure measurement; complete blood count; blood biochemical tests for BUN, creatinine, and serum electrolytes; serological assays of ASLO, immunoglobulins, and complement; urinary cytology, and ultrasonography of the kidney and urinary tract. In general, the possibility of renal parenchymal disease is high when the following are noted: proteinuria, urinary casts, edema in the lower limbs and face, hypertension, renal dysfunction, elevated levels of ASLO and IgA, decreased complement, and bilateral renal atrophy. Subjects who have clinical signs and laboratory findings suggesting the presence of renal parenchymal disease should be referred for detailed examination by a nephrologist. The final diagnosis should be made by renal biopsy. Systemic diseases that may cause hematuria and proteinuria and lead to renal failure include hypertension, necrotizing angiitis, diabetes mellitus, hyperuricemia, amyloidosis, sarcoidosis, collagen diseases such as systemic lupus erythematosus (SLE), multiple myeloma, leukemia, Goodpasture's syndrome etc..1[7,8] Diseases showing hemorrhagic diathesis, such as hemophilia and thrombocytopenic purpura, while not causing renal disorders, can be the cause of hematuria [8]. Glomerulonephritis, a well-known renal parenchymal disease, must be differentiated from a similar condition called persistent hematuria/ proteinuria syndrome, which is associated with persistent hematuria and proteinuria without renal dysfunction. From the viewpoint of treatment, it is critical that these two conditions be differentiated [8] Glomerulonephritis is highly likely when RBCs in urine are irregular in size or shape, when hematuria is accompanied with proteinuria or urinary casts, when there is hypertension or accompanying edema in the lower limbs, when blood test reveals renal dysfunction, or when there is elevated ASLO or IgA or decreased complement. It is also necessary to consider hereditary nephrites such as Alport's syndrome, in which nephritis is accompanied with impaired hearing, and thin basement membrane disease, in which benign recurrent hematuria is present. These diseases are more likely to show the presence of a family history. The definitive diagnoses of these conditions are established by histopathological determination of the glomerular abnormalities, and treatment modalities are then determined.

Urologic diseases that causes hematuria are: Malignant tumor (Renal cell carcinoma, Renal pelvic and ureteral cancer, Bladder cancer, Prostate cancer), Urolithiasis (Kidney stones, Ureteral stones, Bladder stones) Urinary tract infection (Pyelonephritis, Cystitis, Renal and urinary tract Tuberculosis). Typically, the urine dipstick test for blood initially identifies patients with microscopic hematuria. The sensitivity of a urine dipstick test for blood varies from 91% to 100%, and the specificity varies from 65% to 99%[9] The test detects the peroxidase activity of RBCs, so hemoglobin and myoglobin can cause a false-positive result. Other causes of false-positive results include dehydration, exercise, povidone iodine, and oxidizing agents[10]. Urologic diseases are highly likely to be involved when the above-mentioned systemic diseases and renal parenchymal diseases are excluded. Urinary tract infection is a frequent cause of hematuria. Since white blood cells and bacteria are found in the urine, it is not difficult to make the diagnosis of UTI. Pyelonephritis is accompanied with fever and back pain.

V. CONCLUSION

Hematuria is a common complaint in the primary care patient population. Hematuria is generally benign in younger patients with no risk factors, particularly women. However, older individuals, particularly men, should be evaluated for potentially serious urologic conditions such as malignancy. Detection of hematuria on health screening is frequent, but it rarely leads to diagnosis of the causative disease. It is important to establish effective measures for diagnosing the cause of hematuria and provide useful methods of follow up observation.

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