Joshi S, et al. GAIMS J Med Sci 2022;2(2) (Jul-Dec): 9-14
Online ISSN:2583-1763

Original Research Article

Routine urine analysis of gestational women at a tertiary care center in Ratnagiri District of Maharashtra

Shweta Joshi [1*], Bhushan Warpe [2], Ankita Shirke [3], Pradnya Bhise [4], Pratap Shete [5]

1,2: Department of Pathology, Gujarat Adani Institute of Medical Sciences and GK General Hospital, Bhuj city, Kachchh district, Gujarat-370001.
3-5: Department of Pathology, BKL Walawalkar rural medical college and Hospital, At post-Sawarda, Ratnagiri district, Maharashtra-415606.

* Correspondence: Dr. Shweta Joshi (shweta.joshi@gaims.ac.in)

ABSTRACT

Introduction: Apart from short female urethra, the pressure exerted by gravid uterus on genito-urinary tract can serve as harbinger for UTI. Treatment for UTI can start much earlier than positive urine culture reports are derived. The present cross-sectional study was undertaken to estimate the routine urinanalysis in gestational women in a tertiary care hospital of Konkan region, Maharashtra.
Methodology: All the pregnant patients referred to Clinical Pathology section were studied prospectively from 1st January 2021 to 30th June 2021 involving 452 cases. Urine sample was studied for physical properties and urine reagent strip was used for chemical analyses. Post-centrifugation urine-sediments were used for microscopy analysis. All the findings filled in MS-Excel sheet 2010 was analyzed manually.
Results: Maximum patients (77.43%) were in the age group of 20-30 years. Presence of urine deposits was noted in 21.46% cases. Slightly acidic urine pH was seen in 61.72% patients. Majority of pregnant females (94.69%) recorded specific gravity between 1.003-1.030. 40.71%, 8.62% and 7.74% women were having proteinuria, glycosuria and ketonuria respectively. 59.6% cases were having ≥3 pus cells/hpf. 3.31% were having presence of bile pigment. 15% showed presence of casts in urine on microscopy. 10.17% cases showed presence of crystals out of which, 86.95% showed calcium oxalate crystals. The presence of leucocytes was seen only in 17.03% cases. 12.38% cases showed bacteriuria.
Conclusion: Simple routine urine analysis which serves as a 'first-line' investigation to diagnose urinary complaint can help in treatment plan for gestational women.

Keywords: Urinalysis, pregnancy, bacteria, pus-cells, UTI

INTRODUCTION

Pregnancy is physiological, biological and stressful event. There are some problems like hyperemesis gravidarum, hypertensive disorders, anemia, Diabetes Mellitus, urinary tract infection (UTI) in pregnancy, toxoplasmosis, rubella, group-B streptococcus which complicate pregnancy.[1,2]

Urine analysis is a screening test which is an easy method. Urinalysis is used to diagnose various renal disorders, metabolic disorders, diabetes mellitus, bleeding disorders and several other diseases [3]. The clinical manifestation of UTI depends upon the portion of urinary tract involved, etiological organism, the severity of infection and patient's ability to mount an immune response to it. [4]

Gestational Diabetes Mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. [5] Women with severe glycosuria (>250 mg/dL, 2+) during the first two trimesters had a 21% chance of being diagnosed as having GDM. Urine dipsticks for glycosuria are unreliable. A 50g oral glucose challenge is a better test. [6]

Pre-eclampsia is a systemic syndrome affecting various systems like cardiovascular, renal and hepatic systems and it increases maternal morbidity and mortality. [7] The current International Society for the Study of Hypertension in Pregnancy (ISSHP) research definition of pre-eclampsia is systolic blood pressure >140mmHg or diastolic blood pressure >90mmHg with proteinuria of at least 1+ on urine dipstick occurring on two occasions after 20 weeks gestation, whereas that for gestational hypertension is the same criteria for high blood pressure but without co-occurrence of proteinuria. [7] Protein excretion >500 mg/dl is diagnostic of preeclampsia in a hypertensive pregnancy and is associated with negative outcomes. [8]

UTI is one of the most frequently seen medical complications of pregnant women. [9] UTI is more commonly seen in primigravida than multiparous women. [1] The highest incidence of UTI is found maximum in the second trimester, may be due to the physiological changes occurring mostly in the second trimester. [10,11] Vesico-ureteral reflux and stasis of urine predispose to infection risk of UTIs in pregnant women. [12] Pyelonephritis occurs in 1% to 2% of pregnancies.

Knowing the importance of urine examination in gestational ladies, we conducted this pioneer study in a tertiary care hospital in Konkan region of Coastal Maharashtra.

MATERIAL AND METHODS

The data was collected from 1st January 2021 to 30th June 2021 for six months' duration. It was a cross-sectional observational study in clinical pathology section.

Inclusion Criteria: All pregnant females who came for routine urine analysis were randomly included in the study irrespective of clinical details.

Exclusion Criteria: Non pregnant women, males were excluded from the study. Clinical details were not recorded at time of testing. Microbiological culture reports of urine samples were not a part of this study.

Examination of urine: Patient's history regarding age, trimester were recorded with physical properties of urine samples. The midstream clean-catch technique was used to collect urine for simple urine examination and a urine culture. A sterile, dry wide-mouth autoclaved urine container of 30 ml capacity was used. Then it was handed over to the patient & instructions given for collection. The surface cap and sides of urine container were cleaned with tissues paper / cotton. It was labeled with a patient identification number and the investigations done on it.

Investigation of urine: A. Physical tests: - Urine was taken in a clean glass test tube by holding the test tube vertically, followed by pouring urine sample in test tube, avoiding spills. Urine was grossly examined and noted in gross-examination/macroscopy section of reporting format i.e, 1.Quantity, 2.Colour, 3.Appearance, 4.Deposit, 5.pH.

B. Chemical tests: - Urine strip was used for chemical tests. For urine analysis, we used urine reagent strip of 'Mission' by ACON Biotech Co. Ltd. company (China). Procedure: After proper mixing the urine, the reagent area of urine strip was dipped in urine and removed immediately. Urine strip was then held horizontally to wait for the period recommended on the strip bottle. The colour on comparator was compared and written it in urine reporting format.

C. Microscopy: - Small quantity (1-2ml) of urine was taken in a clean, dry test tube. Tube was labeled and centrifuged at 2000 rpm for one minute. Supernatant was discarded. Clean glass slide was taken, and then sediment was dislodged by shaking the tube. The'urine sediment drop' was placed on the glass slide and then covered with cover slip, avoiding formation of air bubbles. The wet-mounted slide was observed under microscope and urine sample was discarded only after reporting.

RESULTS

Total 452 pregnant female patients were examined for routine urine analysis in the six months duration. The maximum patients were in the age group of 20-30 years (Refer Table No.1) i.e, 350 cases out of total 452 cases (77.43%).

Table No. 1- Age Distribution of patients

Age Group (Years)	No of Patients (n=452)	Percentage (%)
<20	7	1.54
20-30	350	77.43
30-40	95	21.01
TOTAL	**452**	**100**

Quantity of urine collected by patients for routine urine analysis: 5-10 ml urine was collected from 329 out of 452 cases (72.78%). 2-5 ml urine samples were obtained from 122/452 cases (26.99%). < 2ml urine sample was seen in only one patient (0.22%). None of the patients had urine volume more than 10 ml.

Color of urine: Urine with pale yellow color was seen in 90.70% (410 out of 452) cases. Dark yellow concentrated urine was seen in 8.84% cases (40/452 cases). Urine was reddish colored in two cases (0.44%).

Appearance of urine: Clear urine samples were seen in 355 cases out of 452 cases, (78.53%). Slightly hazy urine was seen in 20.79% (94/452 cases). Completely hazy urine was seen in 0.66% 03/452 cases).

Presence of deposits in urine: There was no deposit seen in urine in 355 cases out of 452 cases (78.53%). Presence of urine deposits was noted in 97/452 cases (21.46%).

pH of urine: pH of 6 to 7 i.e. slightly acidic urine was seen in 279/452 cases (61.72%). pH of 7 to 8 was seen in 147/452 cases (32.52%). pH of <6 was seen in 4/452 cases (8.62%) while >8 pH was noted in 22/452 cases (4.86%).

Specific gravity: Majority of pregnant females recorded specific gravity in the normal range of 1.003-1.030 (428 cases out of 452, i.e., 94.69%). It was >1.030 in 19/452 cases (4.2%). pH was <1.003 in 5/452 cases (1.1%).

Proteinuria: Only 40.71% women (184 out of 452 cases) were having proteinuria. 59.29% females did not have proteinuria (268/452 cases) (Refer Table No.2).

Table No. 2- Presence of protein in urine-on-urine strip

Proteinuria	**No of patients**	**Percentage %**
Absent	268	59.29
Present	184	40.71
Total	**452**	**100%**

Sugars in urine on strip: Only 8.62% (39 out of 452 cases) were having glycosuria in these patients. (Refer Table No 3). Only 7.74% (35 out of 452 cases) were having ketonuria (Refer Table No.4).

Table No. 3- Presence of Sugar in urine-on-urine strip

Glycosuria	**No of patients**	**Percentage %**
Absent	413	91.37
Present	39	8.62
Total	**452**	**100%**

The pus cells seen on urine microscopy in these patients were normal in range from 0-2 cells/hpf with the percentage of 40.4%. (Refer Table No.5). Urine bacterial culture was advised for the latter cases. 59.6% cases had pus cells as ≥3cells/hpf.

The epithelial cells seen on urine microscopy in these patients were normal in 30.09% range from 0-2/hpf cells (136 /452 cases). Epithelial cells >3/hpf was seen in 69.91% cases. The RBCs seen on urine microscopy (Refer Table No.6) were normal findings (0-2 RBCs/hpf) in 91.59% (414/452) cases. ≥3 RBCs/hpf RBCs was seen in 8.40% (38/452) cases.

Table No. 4- Presence of Ketones in urine-on-urine strip

Ketonuria	**No of patients**	**Percentage %**
Absent	417	92.25
Present	35	7.74
Total	**452**	**100%**

Only 3.31% (15 cases out of 452) were having presence of bile pigment. Only 64 patients with 14.15% showed presence of casts in urine on microscopy. Amongst the casts which were seen of urine microscopy, 93.75% (60 cases out of 64 cases) were showed hyaline casts.

Table No. 5- Presence of pus cells in urine of patient on microscopy

Pus cells (/hpf)	No of patients	Percentage %
0-2	183	40.48
3-5	170	37.61
6-8	43	9.51
9-12	11	2.43
13-15	4	0.89
>16	41	9.08
Total	**452**	**100%**

Hyaline casts are not having much of the clinical significance as its normal finding. Only 46 cases out of 452 (10.17%) showed presence of crystals on routine urine microscopy. Amongst the crystals which were seen of urine microscopy, 86.95% (40 out of 46 cases) showed the morphology of calcium oxalate crystals.

The presence of leucocytes was seen only in 17.03% cases (77 out of 452 cases) which was examined on urine strip reagent method (Refer Table No.7).

The 87.61 % of cases (396/452) did not show presence of bacilli on routine urine microscopy thus, bacteriuria was not seen in majority of our patients. About 12.38% cases showed bacteriuria (Refer Table No.8).

The 96.23% cases (438 out of 452 cases) of these patients did not show presence of candida or any fungal elements on routine urine microscopy. Only 2.87% (13 cases out of 452 cases) showed presence of parasites like trichomonas vaginalis in our patients. In 97.34% cases (440 out of 452 case) nitrites were not detected on urine reagent strip method in these patients. In 96.46% cases (436 out of 452 cases), amorphous material was not detected on urine microscopy.

DISCUSSION

Urinary tract infection (UTI) is, defined by the Infectious Diseases Society of America (IDSA, 2005) guidelines as two consecutive clean-catch voided urine specimens with isolation of the same organism in quantitative counts of ≥105 CFU/mL or as more than 100 organisms per ml of urine with accompanying pyuria (>5 white blood cells per ml) in a 'symptomatic' patient. [13] Low socioeconomic level, high parity and advanced age, are factors associated with urinary infection during pregnancy. [4] Asymptomatic Bacteriuria (ASB) is commonly associated with preterm delivery and low birth weight. In addition, maternal UTI has been associated with increased risk of stillbirth and early onset neonatal sepsis. [14]

Urine microscopy and culture is non-invasive, and considered the 'gold standard' for ASB detection [16]. Sterile pyuria was defined as >10 white blood cells/pus cells or/and >5 red blood cells/per high power field on microscopic examination of centrifuged urine sample and the urine culture was sterile for commonly isolated organisms. [12]

Microscopic examination of urine for the presence of pyuria with nitrite test is option for the rapid screening of UTI. The nitrite test is highly sensitive and specific, whose efficiency was found to be 90.4%. Thus, A positive nitrite test with pyuria is taken as highly reliable marker for bacterial UTI [9]

The present study conducted for urine routine analysis in pregnant females, with respect to examine presence of proteinuria for screening of pre-eclampsia, presence of glycosuria for screening of gestational DM, and screening of presence of UTI.

Table No. 6- Presence of RBCs in urine on microscopy

RBCs (/hpf)	No of patients	Percentage %
0-2	414	91.59
3-5	16	3.53
6-8	8	1.77
9-12	6	1.33
13-15	3	0.68
>16	5	1.1
Total	**452**	**100%**

Only simple urine analysis with usage of urine reagent strip, physical and chemical test and urine microscopy which were available at our institutional (Tertiary Care Hospital Dervan) set up was done during this study. In the present study, maximum 350 cases out of 452 cases (77.43%) were found in younger age of reproductive group (20-30 years of

age) in our study. The same was observed in other studies by with Nazia Tabassum et. al [3], Subedi M et.al [9], Bhabani Pegu et.al [13]

Table No. 7- Presence of Leucocytes in urine strip

Presence of Leucocytes	**No of patients**	**Percentage %**
Present	77	17.03
Absent	375	82.96
Total	**452**	**100%**

Nazia Tabassum et. al [3] study found maximum, 57 cases out of 72 cases (79%) in the age group of 18-25 yrs. Bhabani Begu et.al study [13] also found maximum cases that is 80 cases out of 200 cases (38.23%) in age group of 26–30 years.

In the present study, maximum cases that is, 410/452 cases (90.70%) showed pale yellow color. Nazia Tabassum et. al [3] study showed pale yellow color of urine in maximum cases that is, in 38/72 cases (53%), followed by yellow cloudy (36%) and reddish yellow (11%) cases.

In the present study, appearance of urine was clear in 355 cases (90.70%). Deposits were present in 355 cases (78.53%). In our study, pH of urine in maximum 279 cases (61.72%), was between 6-7 that is slightly acidic. Maximum 428 cases out of 452 (94.69%) cases showed specific gravity between 1.003- 1.030.

Proteinuria was seen in 40.70% of our cases. Nazia Tabassum et.al [3] in their study showed proteinuria in 64% cases. Glycosuria was not much commonly seen in our study (8.62%), which was considered as a one of the methods for screening of gestational DM at our institute. Nazia Tabassum et. al [3] in their study showed meagre 3% cases with glycosuria, which was comparable with our study. In our study, ketonuria was present in 7.74% cases, that is in 35 cases out of 452 cases.

Table No. 8- Presence of bacilli in urine microscopy

Bacilli	**No of patients**	**Percentage %**
Present	56	12.39
Absent	396	87.61
total	**452**	**100%**

In present study, ≤5 pus cells/hpf, on urine microscopy was seen in 353/452 cases (78.09%). Nazia Tabassum et. al [3] recorded < 48.61% cases with ≤5 pus cells/hpf. In present study, ≥6 pus cells /hpf was seen in 99 cases (21.90%). Nazia Tabassum et. al [3] recorded ≥6 pus cells /hpf in 51.38% cases. In clinically suspected UTI cases, Subedi M, et. al recorded ≤5 pus cells/hpf in 94% of their cases while ≥6 pus cells /hpf was seen in 6% of their gestational cases.

In present study, nitrites were present on reagent urine strip method in 2.66% cases. In clinically suspected UTI cases, Subedi M, et. al [9] recorded 17% nitrite positive cases which were all bacterial culture positive. Nitrite positive on strip denotes bacterial infection. We did not do culture study as this is a clinical pathology study and not a microbiological study which is a limitation of this study.

Presence of bacilli (bacteriuria) on urine microscopy was seen in 12.38% cases in our study. Nazia Tabassum et. al [3] in their study showed 51% cases of bacteriuria. About 12.38% cases showed bacteriuria (Refer Table No.8).

≤5 RBCs/hpf in urine microscopy was seen in 95.13% cases of our cases (Refer Table No.6). Nazia Tabassum et. al [3], recorded 42% of their urine samples with ≤5 RBCs/hpf. ≥6 RBCs/ hpf in urine microscopy was seen in 4.86% (22/452) cases in our study. Nazia Tabassum et. al [3] recorded 58.33% cases with ≥6 RBCs/ hpf.

In present study, Hyaline casts was present in 93.75% cases. 10.17% of our cases showed presence of crystals on routine urine microscopy. Nazia Tabassum et al [3], recorded 15% of their cases with crystals in urine routine microscopy.

On routine microscopy, 96.23% cases did not show presence of candida or any fungal elements and was unremarkable for organisms. Parasites like trichomonas vaginalis were present in 2.77% cases in our study.

CONCLUSION

Proteinuria, glycosuria, & presence of UTI were not commonly seen in examined pregnant females at this institute. Thus, routine urine analysis with urine sediment microscopy, reagent strip method, physical as well as chemical tests can be used as baseline tests for screening of pre-eclampsia, gestational DM & UTI in pregnant females at rural set ups. Treatment for UTI can start much earlier than positive urine cultures by simple routine urine examination. However, other advanced & diagnostic tests like protein: creatinine ratio, OGTT, urineculture must be used for confirmatory diagnosis of these conditions.

Limitation: This study is based on clinical-pathology. Microbiological testing (culture) and clinical details were not recorded at time of presentation of our pregnant patients for urinanalysis. Further investigations like urine culture, USG/CT abdomen for urinary pathology was advised based on urinanalysis report but were not followed, as it was an observational clinical-pathology study.

REFERENCES

1. John ST, John RE. A Descriptive study to Assess the knowledge regarding Prevention of urinary Tract infection during Pregnancy among Antenatal mothers in a selected community area Kayamkulam, Kerala. IJSR 2020;9(2):1-3.
2. Liu X, Wang X, Sun H, Guo Z, Liu X, Yuan T, et.al. Urinary metabolic variation analysis during pregnancy and application in Gestational Diabetes mellitus and spontaneous abortion biomarker discovery. Scientific report 2019;9:1-9.
3. Tabassum N, Khurshid SU. Analysis of urine as an indicator of specific in rural women in rural mountainous region. Int J Sci Rep. 2020;6(7):264 -268.
4. Feitosa DCA, Silva MG, Parada CMGL. Accuracy of simple urine tests for diagnosis of urinary tract infections in low-risk pregnant women. Rev Latino-am Enfermagem 2009; 17(4):507-13.
5. Sachse D, Sletner L, Morkrid K, Jenum AK, Birkeland KI, Rise F, et.al. Metabolic changes in urine during and after pregnancy in a large Multiethnic population-based cohort study of gestational diabetes. PLoS ONE 2012;7(12):e52399.
6. Alto WA. No needed for routine glycosuria / proteinuria Screen in pregnant women. The Journal of Family Practine 2005;54(11):978-984.
7. Macdonald-Wallis C, Lawlor DA, Heron J, Fraser A, Nelson SM, Tilling K. Relationships of risk factors for pre-eclampsia with patterns of occurrence of isolated gestational proteinuria during normal term pregnancy. PLoS ONE (2011);6(7):e22115.
8. Saxena I, Kapoor S, Gupta RC. Detection of proteinuria in pregnancy: comparison of Qualitative test for proteins and Dipsticks with urinary protein Creatinine Index. Journal of clinical and Diagnostic Research 2013;7(9):1846–1848.
9. Subedi M, Basnyat SR, Acharya SD. Urinary Tract Infection in Pregnancy and its Correlation with Nitrite Test. J Nepal Health Res Counc. 2009;7(15):80-83.
10. Michael E. Urinary tract infection and its effect on outcome of pregnancy. Indian Journal of Obstetrics and Gynecology Research 2017;4(2):108-111.
11. Beksac AT, Orgul G, Tanacan A, Uckan H, Sancak B, Portakal O, et al. Uropathogens and Gestational Outcomes of Urinary Tract Infections in Pregnancies that Necessitate Hospitalization. Curr Urol. 2019; 13:70–7
12. Awasthi A, Adiya P, Rao S. Prevalence of asymptomatic bacteriuria and sterile pyuria in pregnant women attending antenatal clinic in a tertiary care center in Karnataka: A pilot study. Clinical Epidemiology and Global Health I 2013 ;44-49
13. Gaughran J, Chung B, Lyne T, Syeda N, Field D, Hamilton J. Is routine urine dip stick testing justified in asymptomatic women in early pregnancy? Int J Reprod Contracept Obstet Gynecol. 2021;10(1):17-21
14. Lee ACC, Mullany LC, Koffi AK, Rafiqullah I, Khanam R, Folger LV, et.al. Urinary tract infections in pregnancy in a rural population of Bangladesh: population-based prevalence, risk factors, etiology, and antibiotic resistance. Pregnancy and Childbirth 2020;20(1):1.

Source of support: Nil
Conflict of interest: None declared

How to cite: Joshi S, Warpe B, Shirke A, Bhise P, Shete P. Routine urine analysis of gestational women at a tertiary care center in Ratnagiri District of Maharashtra.GAIMS J Med Sci 2022;2(2):9-14
https://doi.org/10.5281/zenodo.7151770