Analytical Study of Urine Samples for Epidemiology of Urinary Tract Infections by using Urine R/E in Local Population of Abbottabad, Pakistan

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ABSTRACT: *The current study was carried out in District Abbottabad aimed to determine the common urinary tract infections in local community to determine the epidemiology of significant diseases in asymptomatic patients of renal disorder. In this study a total of 1000 urine samples were examined during 3rd February to 1st April 2015 from patients attending Ayub Teaching Hospital Abbottabad by using dipstick and microscopic analysis of urine. There were 638 females and 362 males patients examined during this period. The range of age groups is between 1.5 years to 80 years. Results of this study was reported as Pyuria 11%, Proteinuria 21.1%, Hematuria 10.4%, Epithelial Cells 8.2%, pH 7.8 %, Granular casts 7.3%, Triple phosphate 6.6%, Calcium oxalate 6.4%, Glycosuria 6.3%, Bacteria 6.2% and mucous 4.1%. This study concludes that routing urinalysis should be performed for all individuals to diagnose the asymptomatic diseases that will help in simple therapeutic measurements as urinalysis is a simple step to determine the root of Urinary tract disorders.*
KEYWORDS: Proteinuria, Glycosuria, Hematuria, Pyuria, Epithelial Cells.

I. INTRODUCTION

The routine examination of urine is a good tool for the calculation and observation of many diseases in human body. Different physico-chemical properties including color, pH, proteins, glucose, blood, and other abnormal constituents are the main objectives in any routine urine examination. Microscopic examination is done for the detection of RBCs, bacteria, leucocytes (pus cells), crystals, epithelial cells and casts. Generally a 10 ml urine sample is enough to conduct this test [1]. Sample of urine must be cooled if it cannot be examined quickly. For the reliable results time interval should be more than two hours between collection of sample and its assessment [2]. The samples with abnormal physical conditions are clinically considerable because they can rise from many non-pathologic causes. Due to that the false negative and false positive results are familiar [3].

Abnormal urine test is the initial evidence of a major renal disorder [4]. Due to the simplicity of urine analysis it is the finest technique in early finding of mainly frequent conditions like hematuria, proteinuria or glucosuria at a very low expenditure. It is valuable in nominating patients with renal diseases who then get benefit of early on treatment, counseling or long term follow up [5]. Urine RE is of great importance in the identification of symptomatic and analysis of asymptomatic disorders like assessment of kidney functions, UTI, metabolic disorders, jaundice, hemorrhagic conditions, kidney stones, trauma and malignancy etc [6].

Urine dipstick analysis is used worldwide in various clinical laboratories [7]. In adult's asymptomatic dipstick analysis for haematuria is a common discovery [8]. In microscopy proteinuria without haematuria is frequently a subsidiary finding and with a thorough study, the reason of the microscopic haematuria often is not found [9]. For bacteriuria dipstick analysis, this has an important value for screening adults, so the efficiency for microscopic haematuria test is now in doubt [10].

Standard method used for the detection pyuria is microscopic examination of urine. But to measure the urinary leukocytes the quick, cheap and without having technical skills dipstick test is used. It is an emergency test to identify pyuria in accidents and in outpatient clinics where microscopic analysis is not available [11].
The present investigation was designed to evaluate the status of different common diseases in local population of Abbottabad by examine their urine through routine tests. This study will be very effective in constructing the future threat of many common diseases in District Abbotttabad.

II. METHODOLOGY

a) Study Area

The present study was carried out in District Abbottabad located in the Hazara division, KPK province, in north eastern region of Pakistan. The city is situated in the Orash Valley lying between 34°92′N latitude and

73°13′E longitude, at an altitude of 1,260 meters (4,134 ft). The city is well known throughout Pakistan for its pleasing climate, high-standard educational institutions and armed forces

b) Study population

A total of 1000 Urine samples were collected from local population of Abbottabad scattered in different parts of District. All these patients were attending Ayub Teaching Hospital Abbottabad and DHQ Abbottabad. A prior permission was taken from both patients and ethical committee of the hospitals.

c) Sample Collection

A fresh urine sample (10ml to 15 ml) was obtained from patient in urine bottles. Different parameters like age, Residence, type of diet, use of antibiotic and clinical history of patients were taken through questioner.

d) Physical Analysis

Chromatic analysis of urine was done by examination of urine color. The difference in the color like Yellow, Pale Yellow, Dark Yellow and Reddish were noted. The urine was then transferred into the specimen bottles for further analysis.

e) Dipstick Urinalysis

Dipstick analysis is a chemical analysis. So Combi-3, which is a dipstick strip used to test three chemical components of urine pH, glucose and protein. For this purpose we take 30 ml and dip strip into urine sample and then let it for 2 min to get the results.

f) Microscopic Analysis

For microscopy urine sample was first centrifuged at 3000 rpm for 5 minutes. After supernatant was decant the sediment suspended in the remaining liquid. After that, a single drop of urine was transferred to a clean glass slide and a cover slip was fixed over the glass slide. Microscopic analysis of patient's urine was done to check the presence of different type of microscopic components present in urine i-e RBC's, pus cells, epithelial cells, Calcium Oxalates, Triple Phosphate, amorphous urates, granular cast, mucous and presence of bacteria. Through this microscopic examination of patient's urine different type of cells were identified and were counted reflecting the abnormality or normality of urine.

III. RESULTS & DISCUSSIONS

History shows that routine urine examination is used about 400 BC and it turns out to be the most important diagnostic test [12]. In our daily life most commonly used form of urine screening is dipstick analysis, it turns out to be the most costly and accurate screening test to determine urinary tract infections in adults [13]. Carl *et al.,* study 2100 persons by means of dipstick screening, which revealed that at least 10% peoples showing a single urinary tract deviation [14].

During investigation a simple survey was conducted to find out most prevalent infectious diseases claiming by patients in District Abbottabad. It was reported that Abdominal Pain, Anorexia, Edema, Enteric Fever, Flank Pain, Hydro-nephritis, Irregular urination, Kidney Infection, Kidney Pain, Kidney Stones, Liver Inflammation, Nephrolithiasis, Pregnancy Infections, GIT, Diabetes, T.B, Urine tract Blockage and Urine tract Inflammation are common infection diseases found in District Abbottabad. Order of Infections was Kidney Stones > Pregnancy Infections > Kidney Pain > Enteric Fever > GIT > T.B > Abdominal Pain > Diabetes > Edema > Irregular urination > Nephrolithiasis > Kidney Infection > Urine tract Inflammation > Flank Pain > Anorexia > Urine tract Blockage > Hydro-nephritis > Liver Inflammation. All infections were counted and the percentage of their prevalence was reported on the bases of average among Patients visiting Ayub Teaching Hospital Abbottabad for Routine examination of Urine as shown in Fig 1. In current study period a total 1000 samples were collected during survey, a total of 362 (36.2%) males and 638 (63.8%) females were analyzed. The age groups reported are between 1 to 80 years. Age groups reported are classified into intervals of 10 years into 8 classes with a wide range of age from 1.5 years to 80 years where as the mean age reported was 38 years. Majority of patients visiting for Urinalysis are in the age group of 21-30 years followed by 30-40 years Fig. 2. Out of 1000 samples examined total of 256 (25.6%) patients i-e 94 (9.4%) males and 162 (16.2%) females had positive findings while total of 744 (74.4%) patients tests were normal/negative findings Fig. 3. In current study Pyuria was the most commonly founded parameter in the urine samples of local population as it was calculated in 211 (21.1%) samples, followed by the Proteinuria in 110 (11%), Hematuria in 104 (10.4%), Epithelial Cells in 82 (8.2%), altered pH in 78 (7.8 %), Granular casts in 73 (7.3%), Triple phosphate in 66 (6.6%), Calcium oxalate in 64 (6.4%), Glycosuria in 63(6.3%), Bacteria in 62 (6.2%) and mucous in 41 (4.1%) Table 1. Statistical analyses, Descriptive analysis, one way ANOVA and Coefficient of parameters under study are described in Table 2 to Table 4.

Urine testing has been a part of medicine for many centuries, with Hippocrates having written about urine examination as early as 400 B C [15]. 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 erythroctyes 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 (± 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 [16].

Craver and Abermanis found 136 (58%) girls out of 236 children's they were studied [17]. In Arinzon *et al.,* study to determine the comparison between standard urinalysis and Multistix 10 SG in elder patients for the untimely detection of UTI that shows most of patients were female i-e 78% [18]. Khalid and Haddad's study results showed that 150 (61%) males and 97 (39%) females out of 247 students [19]. 52% females were founded in Topham *et al.,* study [20]. We can clearly see that females are in the majority in most of studies. Kerr *et al.,* ranked age groups from 17 years to 94 years having mean age i-e 50 years [21]. In a study by Khallid and Haddad ages ranged from 18 years to 38 years and mean age was 20.08 years [19]. Topham *et al.,* study had age group range of 18 years to 59 years with mean age of 21.8 years [20]. Healthy adults normally excrete 80-150 mg protein in urine daily. Normal urinary proteins include serum globulins, albumin, and proteins secreted by the nephron. Detectible 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 proteincreatinine ratio and microscopic examination of the urinary sediment, urinary protein electrophoresis, and assessment of renal function [21]. In a study by Khallid and Haddad it was found that the frequency of pyuria was 8.1%, haematuria 6.1% and proteinuria 4.8% [19]. Results of Topham *et al.,* study showing proteinuria 3.8% and haematuria as 1.7% [22]. In Nigeria report of routine examination of urine by Oviasu *et al.,* present proteinuria 4.7% and 0.55% hematuria [23]. Al Homrany *et al.,* in Saudi Arabia during routine urine examination found 11.7% proteinuria, 11% hematuria and 4.7% Glycosuria [24]. Granular casts, Triple phosphate, Calcium oxalate and mucous are not previously studied so further investigation is required.

Better strategies should be adopted to minimize unnecessary tests cost, for example, by use of multi-test dipsticks for initial screening by a competent nurse at bedside or outdoor department. The question, whether the laboratory tests are being used more as an expensive screening tool for accidental diagnosis or as an aid to confirm provisional clinical diagnosis, still needs conscientious answer by clinician. Urine analysis 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 [25]. 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.

IV. CONCLUSION

It is concluded that Pyuria is the most prevailing disease found in all subjects under study followed by Proteinuria these two are the most common diseases founded in Abbottabad region. The results of our study are much higher as compared to present investigation in Abbottabad region and other areas. This is because we have the results that might be differ due to the reason that we study patients instead of normal persons. The results of present study will help in finding the pre and post urinary tract diseases and their modification as well as the level of common UTI diseases in local population.

V. ACKNOWLEDGMENTS

Figure 1: Physical and Physiological condition of Patients during study

Physical and Physiological condition

Legend:
- Abdominal Pain
- Anorexia
- Edema
- Enteric Fever
- Flank Pain
- Hydronephrosis
- Irregular urination
- Kidney Infection
- Kidney Pain
- Kidney Stones
- Liver Inflammation
- Nephrolithiasis
- Pregnancy Infections
- GIT
- Diabetes
- T.B
- Urine tract Blockage
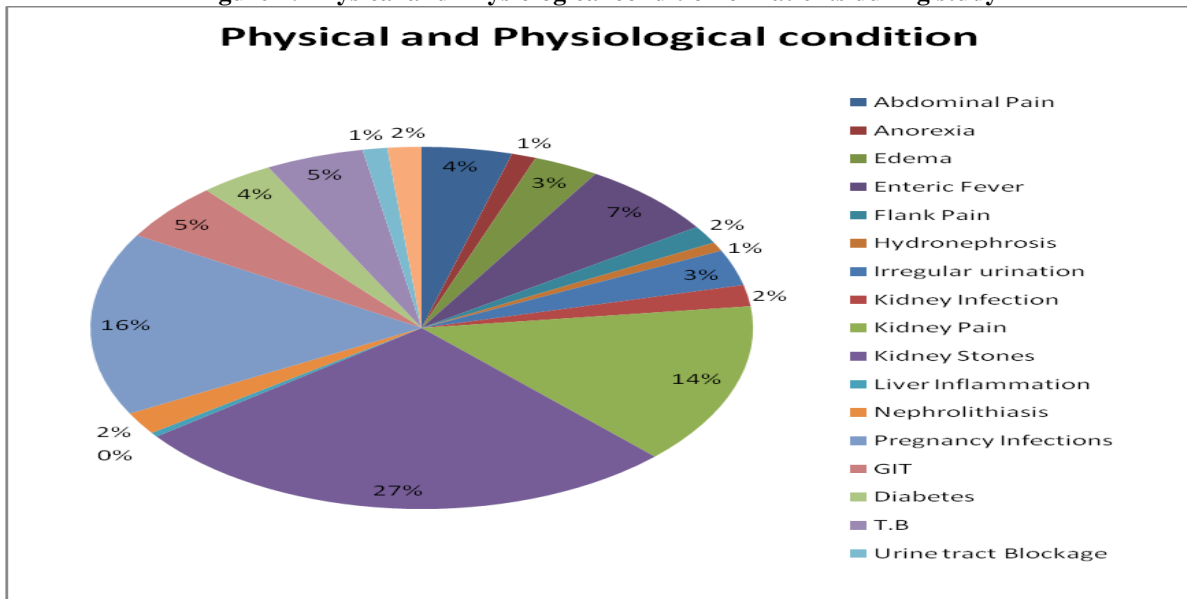
Figure 2: Distribution of patients according to different Age Groups

Age Groups

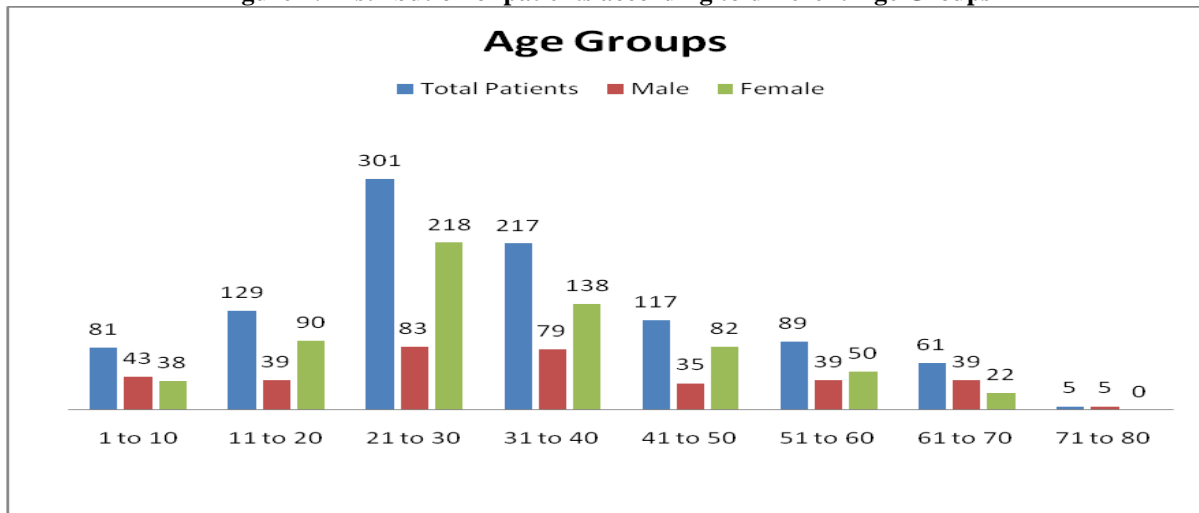**Figure 3: Patients with positive and negative**

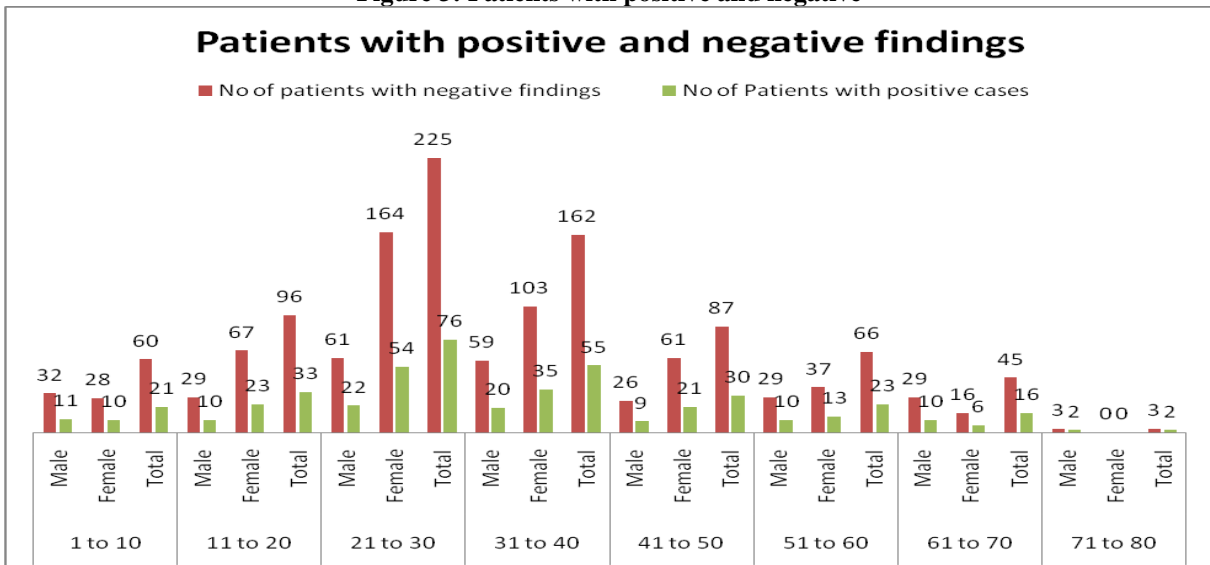**Patients with positive and negative findings**

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

Age Groups	Gender	Glycosuria	Proteinuria	pH	Pyuria	Epithelial Cells	Hematuria	Calcium oxalate	Triple Phosphate	Amorphous Urates	Granular Casts	Mucous	Bacteria
1 to 10	Male	2	4	2	6	1	3	3	5	1	2	0	2
	Female	3	4	1	9	2	5	3	3	4	1	0	0
	Total	**5**	**8**	**3**	**15**	**3**	**8**	**6**	**8**	**5**	**3**	**0**	**2**
11 to 20	Male	0	6	5	9	2	2	5	3	2	5	0	3
	Female	1	9	14	21	10	9	8	10	5	4	5	6
	Total	**2**	**15**	**19**	**30**	**12**	**11**	**13**	**13**	**7**	**9**	**5**	**9**
21 to 30	Male	3	8	6	18	7	9	7	13	9	7	4	11
	Female	20	22	15	38	21	19	13	11	8	12	9	14
	Total	**23**	**30**	**21**	**56**	**28**	**28**	**20**	**24**	**17**	**19**	**13**	**25**
31 to 40	Male	1	9	5	18	4	12	3	4	3	4	7	5
	Female	11	14	8	31	11	15	5	4	6	7	11	6
	Total	**12**	**23**	**13**	**49**	**15**	**27**	**8**	**8**	**9**	**13**	**18**	**11**
41 to 50	Male	4	3	2	8	6	3	2	0	1	3	1	4
	Female	4	7	5	18	10	6	4	0	2	8	0	5
	Total	**8**	**10**	**7**	**26**	**15**	**9**	**6**	**0**	**3**	**11**	**1**	**9**
51 to 60	Male	1	5	3	9	2	3	3	3	3	4	3	4
	Female	5	6	4	10	5	8	2	5	1	6	1	1
	Total	**6**	**11**	**7**	**19**	**7**	**11**	**5**	**8**	**4**	**10**	**4**	**5**
61 to 70	Male	4	6	4	9	1	5	3	3	1	3	0	0
	Female	2	5	4	5	1	3	3	2	0	3	0	1
	Total	**6**	**11**	**8**	**14**	**2**	**8**	**6**	**5**	**1**	**6**	**0**	**1**
71 to 80	Male	1	2	0	2	0	2	0	0	0	2	0	0
	Female	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**1**	**2**	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**
Overall		**63**	**110**	**78**	**211**	**82**	**104**	**64**	**66**	**46**	**73**	**41**	**62**
Percentage		**6.3%**	**11%**	**7.8%**	**21.1%**	**8.2%**	**10.4%**	**6.4%**	**6.6%**	**4.6%**	**7.3%**	**4.1%**	**6.2%**

Table 2: Statistical Analysis/Descriptive Statistics of Parameters

Parameters	Age	Glycosuria	Proteinuria	pH	Pyuria	Epithelial Cells	Hematuria	Ca Oxalate	Triple Phosphate	Amorphous Urates	Granulo-cast	Mucous	Bacteria
Std. Deviation	.482	1.613	.812	.679	.684	.879	.883	.750	.785	.610	.486	.824	.495
Variance	.233	2.600	.659	.461	.468	.773	.780	.563	.616	.372	.236	.679	.245
Skewness	-.552	.404	1.771	1.066	-.227	1.049	1.336	1.784	1.929	1.632	2.117	.711	-.301
Std. Error of Skewness	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076	.076
Kurtosis	-1.699	-.337	1.909	.497	-.875	1.101	.412	3.694	2.753	1.468	3.733	-1.160	-1.913

Table 3: Coefficients of Parameters by using Dependent Variable Age

Parameters	Un Standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Glycosuria	0.219	0.061	0.114	3.611	0
Proteinuria	0.207	0.077	0.089	2.671	0.008
pH	0.342	0.076	0.151	4.487	0
Pyuria	0.183	0.058	0.101	3.144	0.002
Epithelial cells	-0.129	0.053	-0.074	-2.440	0.015
Hematuria	0.043	0.067	0.021	0.651	0.515
Ca Oxalate	-0.313	0.065	-0.158	-4.841	0
Triple Phosphate	-0.347	0.077	-0.136	-4.502	0
Amorphous Urates	-0.193	0.098	-0.060	-1.978	0.048
Granulo-cast	-0.219	0.057	-0.116	-3.831	0
Mucous	-0.028	0.100	-0.009	-0.277	0.782
Bacteria	-0.218	0.106	-0.064	-2.050	0.041
a. Dependent Variable: Age					

Table 4: One Way ANOVA by using Dependent Variable Age

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	394.102	17	23.182	11.219	0
Residual	2023.003	979	2.066		
Total	2417.105	996			

a. Predictors: (Constant), Bacteria, Hematuria, Glucose, Amorphous Urates, Triple Phosphate, pH, Granulo-cast, Epithelial, Mucous, Ca Oxalate, Proteinuria

b. Dependent Variable: Age

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