

URINE ANALYSIS AND URINARY TRACT INFECTIONS IN THE REGION OF THE POPULATION OF TETOVO

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Abstract

Urine and urine tests are the main biomarkers of urinary tract infections. Our study aims to study the urine analysis and urinary parameters of men and women in the Tetovo region with acute and chronic urinary infections.

In this study, we took for research 320 urine samples in the period 2021 to 2022 from patients attacked in the clinical laboratory of Tetovo Hospital and the Albimedika biochemical laboratory. The analyzed patients were grouped from the age of 12 to 85 years.

Urine analyzes were performed by collecting urine in sterile cups and using the urine microscopy method and urine strip test using the chromatographic method, where these analyzes were performed according to the European standards manual.

Out of 320 patients, 220 were female and 100 male patients, we have resulted in patients with Proteinuria , leukocyturia, Epithelial Cells, Hematuria , urine pH, Granular casts , Triplet phosphate , Calcium oxalate , Glycosuria , Bacteria and mucous . The obtained results show that urine and urinary infections in man and women are the main indicators of urinary tract infections in patients with acute and chronic infections as well as asymptomatic patients who have had no clinical symptoms.

Keywords: Proteinuria, hematuria, leukocyturia, glycosuria, epithelial cells.

1. Introduction

Urinalysis is one of the most ancient and basic tests to evaluate the presence, severity, and course of diseases of the kidney and urinary tract. Therefore, when a patient is first seen by a nephrologist, a complete basic investigation of the urine should always be requested.(Beath Verlag et al,1986).

In most instances, this is done by means of dipstick, a widely accepted method for screening purposes because of its quick, simple, and inexpensive use. However, clinicians too often are unaware of the principles and limits of this approach, which allows one to detect and obtain an approximate estimation of concentrations of a number of analytes, including albumin, blood, leukocytes, and bacteria.(Giovanni B. Fogazzi,2007).

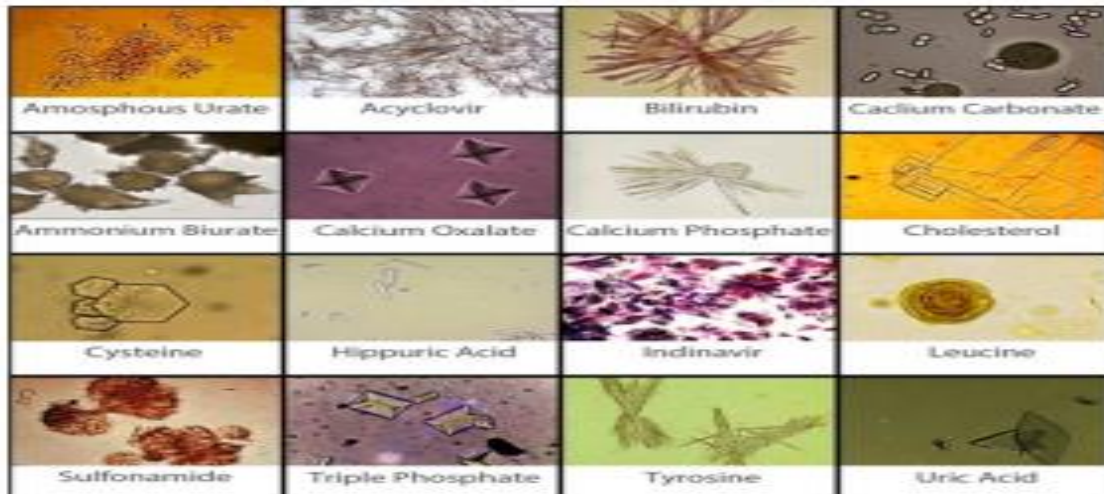


Figure 1. Types of urinary crystals (Sharique Ahmad, Amina Maqbool, 2015)

They are frequently found in the urine of patients with kidney disease. Clinically, they show morphological variations, Isomorphic erythrocytes are similar to erythrocytes found in the blood, suggestive of hematuria of urological origin. Dysmorphic erythrocytes have irregular shape and contours and found in glomerular disease. Hematuria is considered to be of glomerular origin when 40% or more are of dysmorphic and 5% or more erythrocytes are acanthocytes. (Graham JC, Galloway A. et al, 2001).

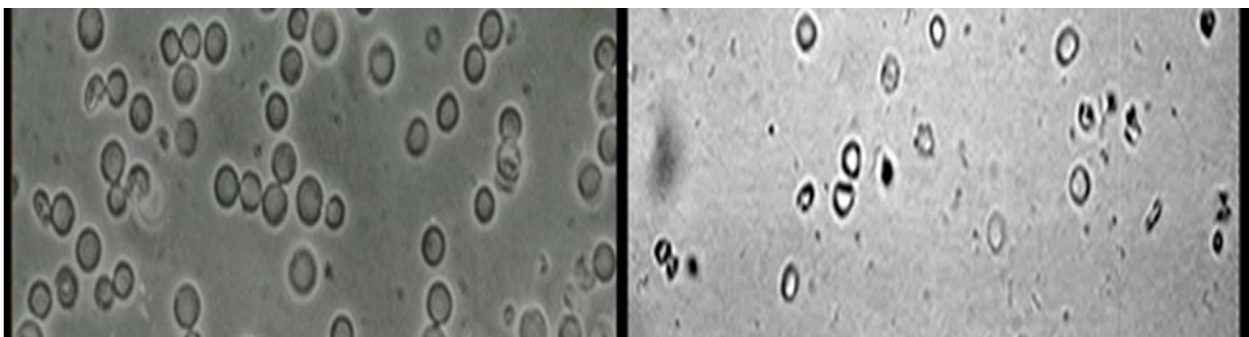


Figure 2. Isomorphic erythrocytes and dysmorphic erythrocytes (Gogol S, Siddiqui FA, et al, 2019)

2. Aim of Study

Urinary infections are the main indicators in the early identification of kidney pathologies, therefore taking into account the elements in the urine sediment and proteinuria was the main reason for the study of these parameters, having as a study group the men and women of the region of Tetovo and its surroundings.

Tetovo is located in the northwestern part of Macedonia with an altitude of 468 meters above sea level and with a mountainous continental climate where we have big temperature changes during winter and summer.

Also, the physical-chemical properties of Tetovo's drinking water, which originates from Sharr Mountain, are rich in many minerals and the strength of the water allows the population of Tetovo to have more of urine infections and kidney stones.

3. Material and methods

a) Study Area

The present study was carried in Tetovo and Polog region in the West region of North Macedonia. Tetovo is in high amplitude of 4680 and with continental and mountain climate change.

b) Study population

A total of 320 urine samples were collected from local population of Tetovo in period of 2021-2022 in male and female patients in Clinical Hospital in Tetovo and biochemistry laboratory Albimedika in Tetovo.

c) Sample Collection

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

d) Physical Analysis

Chromatographic analysis of urine was done by examination of urine color. The differences in the urine 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.

Example of Instructions for Urine Collection

Avoid strenuous physical exercise (eg, running or a soccer match) in the 72 hours preceding the collection to prevent exercise-induced proteinuria and/or hematuria or cylindruria.

Avoid urinalysis during menstruation because blood contamination can occur, which can erroneously lead to a diagnosis of hematuria.

In case of mild genital discharge (eg, leucorrhea), use internal tampons to prevent contamination.

Wash your hands.

Wash the urethral meatus after spreading the vulvar labia (female) or withdrawing the foreskin of the glans (male) and wipe with a towel.

Collect the urine after discarding the first portion of micturition (midstream technique) to reduce contamination from urethral and/or vaginal cells and secretions.

Close the container completely and write your name clearly and in full on the label.

Urine particles can lyse rapidly after collection, especially when urine pH is alkaline and/or specific gravity or osmolality is low. Thus, it is recommended that the sample be analyzed within 2 to 4 hours from collection. Otherwise, samples can be kept at a temperature of +2°C to +8°C; however, this procedure favors precipitation of phosphates or urates, which makes examination of the sample

difficult and inaccurate. Alternatively, formaldehyde, glutaraldehyde, and “cellfix” (a formaldehyde-based fixative [Becton Dickinson and Company, Erembodegem, Belgium]) can be used as preservatives of urine particles. However, preservatives can alter the appearance of particles. Thus, every effort should be made to examine samples within 2 to 4 hours from collection. For this reason, in our laboratory, we usually examine samples within 2 to 3 hours from collection. We only use formaldehyde or cellfix to preserve particles for teaching purposes.(Fogazzi GB, Ponticelli C, Ritz E,1999).

Leucocytes

Men normally have less than two white blood cells (WBCs) per HPF (High Power Field) Women normally have less than five WBCs per HPF.

Bacteriuria

Clean catch urine sample from female patients are mostly contaminated by the vaginal flora. In these patients, five bacteria per HPF represents roughly 100,000 colony forming units (CFU) per mL, commensurating with asymptomatic bacteriuria and is compatible with a UTI. In symptomatic patients, a colony count as low as 100 CFU per mL suggests UTI, and antibiotics should be Administered. The presence of bacteria in a collected male urine specimen with full precautions is suggestive of infection, and a culture should be performed.

Casts

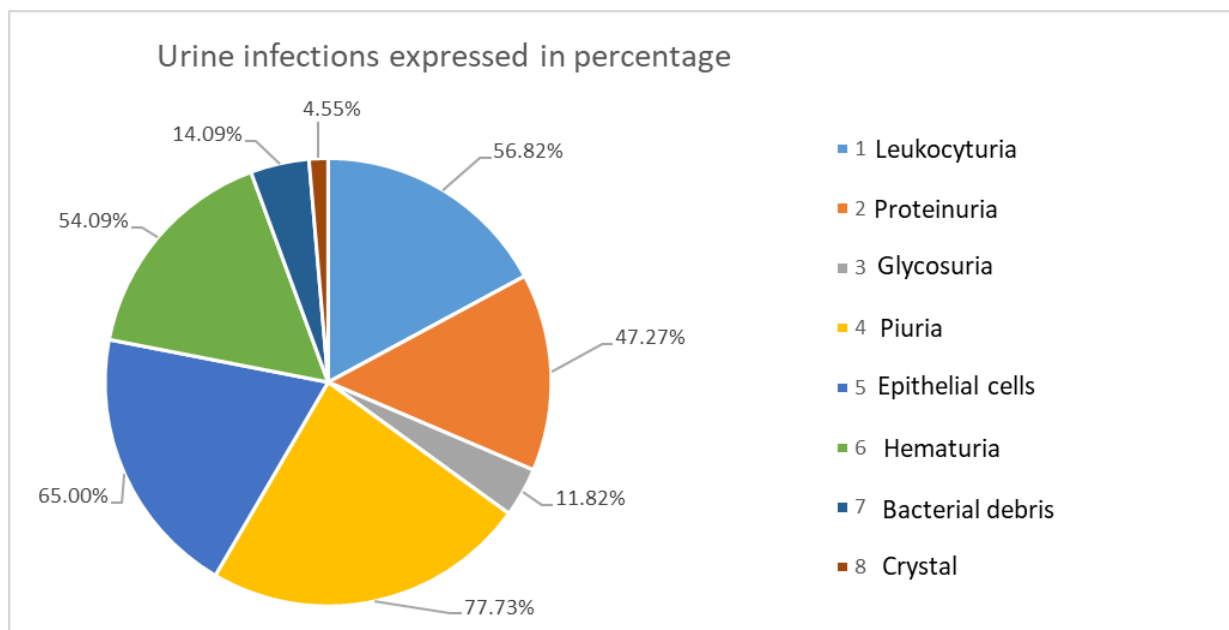
Casts comprise a coagulum of Tamm - Horsfall mucoprotein and trapped contents of tubule lumen, originate from the distal convoluted tubule or collecting duct during urinary concentration or stasis, high solute concentration, abnormal ionic or protein constituents or when urinary pH is very low. Their cylindrical shape reflects the tubule in which they were formed and housed when the casts are washed away. The predominant cellular elements determine the type of cast which include: hyaline, erythrocyte, leukocyte, epithelial, granular, waxy, fatty, or broad etc.

4. Results

After analyzing the urine of men and women, we came to the conclusion that a large number of patients have proteinuria and urinary infections in men and women.

Table1. Urine analysis of women in different age groups

Analysis		Leukocyturia	Proteinuria	Glycosuria	Piuria	Epithelial cells	Hematuria	Bacterial debris	Crystal	pH	Specific weight
Patient data	Number of patients										
Age groups											
12-40 years	45	25	15	3	38	25	18	8	1	6.8	1,020
41-55 years	80	44	39	6	69	48	36	10	3	6.6	1,018
56-70 years	62	37	37	5	43	47	40	7	2	6.9	1,021
71-85 years	33	19	13	12	21	23	25	6	4	6.5	1,022
Total	220	125	104	26	171	143	119	31	10	6.7	1,020
Percentage		56.82%	47.27%	11.82%	77.73%	65.00%	54.09%	14.09%	4.55%		

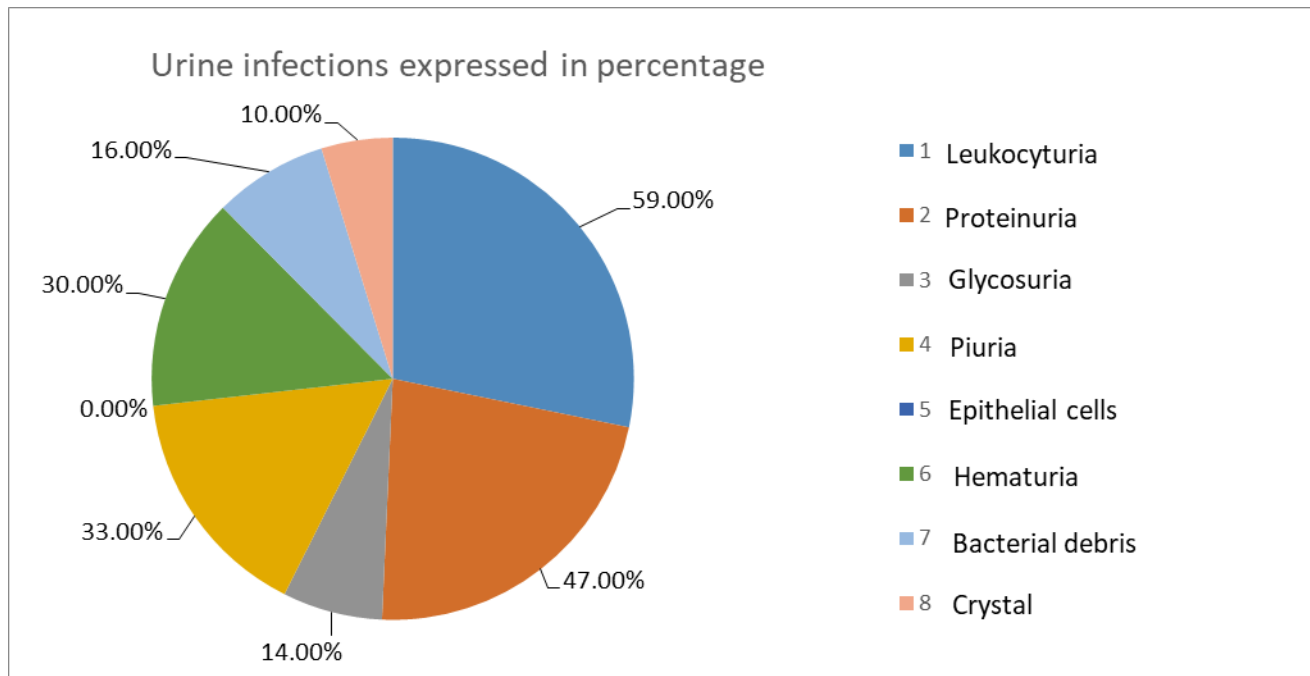


Graph 1. Urine analysis of women in different age groups

The results obtained from the urine analysis of the female gender show a high significance of urinary infections expressed in percentages for leukocyte 56.82%, proteinuria with 47.27%, glycosuria with 11.82%, pyuria with 77.73%, the presence of epithelial cells with 65%, hematuria with 54.09%, bacterial debris with 14.09% and the presence of crystals in the urine sediment with 4.55%.

Table 2. Urine analysis of men in different age groups

Analysis		Leukocyturia	Proteinuria	Glycosuria	Piuria	Epithelial cells	Hematuria	Bacterial debris	Crystal	pH	Specific weight
Patient data											
Age groups	Number of patients										
12-45 years	20	14	8	1	5	/	7	2	1	6,9	1.013
12-45 years	30	17	13	3	8	/	6	3	2	6,8	1.015
12-45 years	25	12	10	6	9	/	8	6	4	6,5	1.016
12-45 years	25	16	16	4	11	/	9	5	3	6,9	1.020
Total	100	59	47	14	33	0	30	16	10	6,77	1.016
Percentage		59,00%	47,00%	14,00%	33,00%	0,00%	30,00%	16,00%	10,00%		



Graph 2. Urine analysis of men in different age groups

The results obtained from the urine analysis of the male gender show a high significance of urinary infections expressed in percentages for leukocyte 59.00%, proteinuria with 47.00%, glycosuria with 14.82%, pyuria with 33.00%, the presence of epithelial cells with 00.0%, hematuria with 30.00%, bacterial debris with 16.00% and the presence of crystals in the urine sediment with 10.00%.

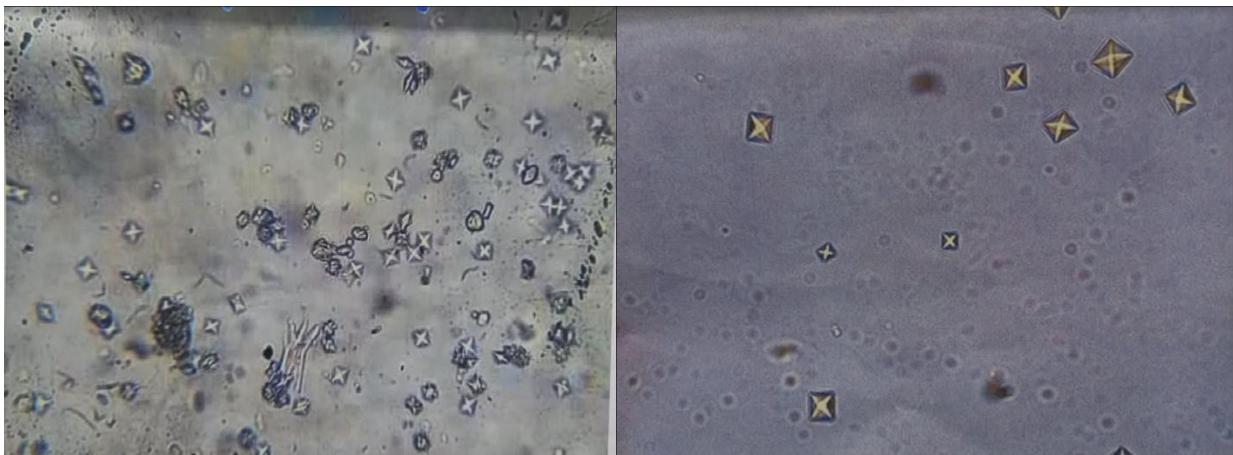


Figure 3. The presence of calcium oxalate crystals in the urine sediment in the patients in the study (Photo taken from the biochemical laboratory of the Clinical Hospital - Tetovo 2022)

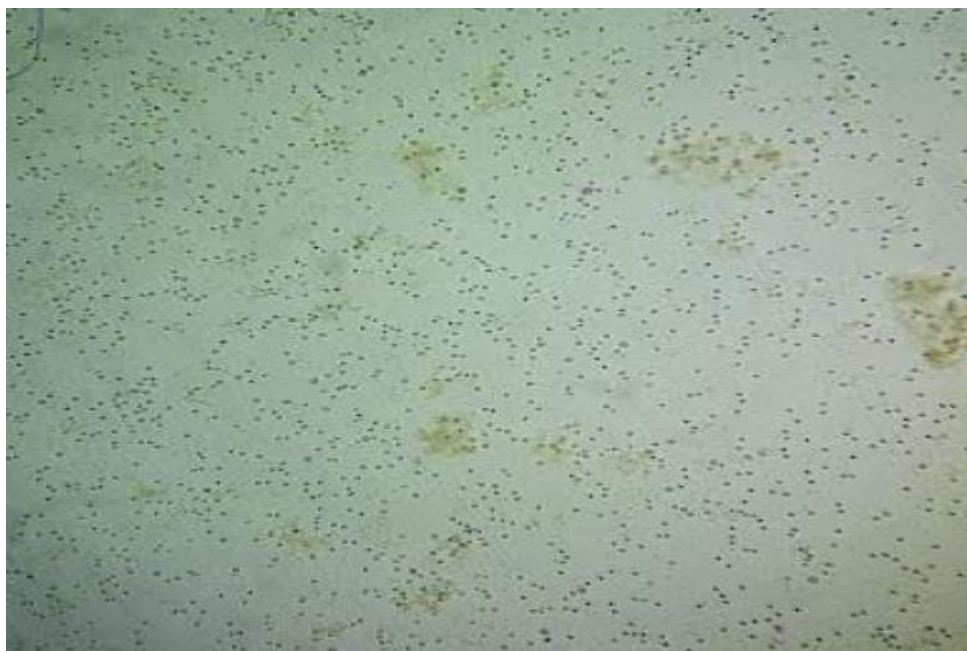


Figure 4. The presence of leukocytes and erythrocytes in the urine sediment in the patients in the study (Photo taken from the biochemical laboratory "Albimedika", Tetovo 2022)

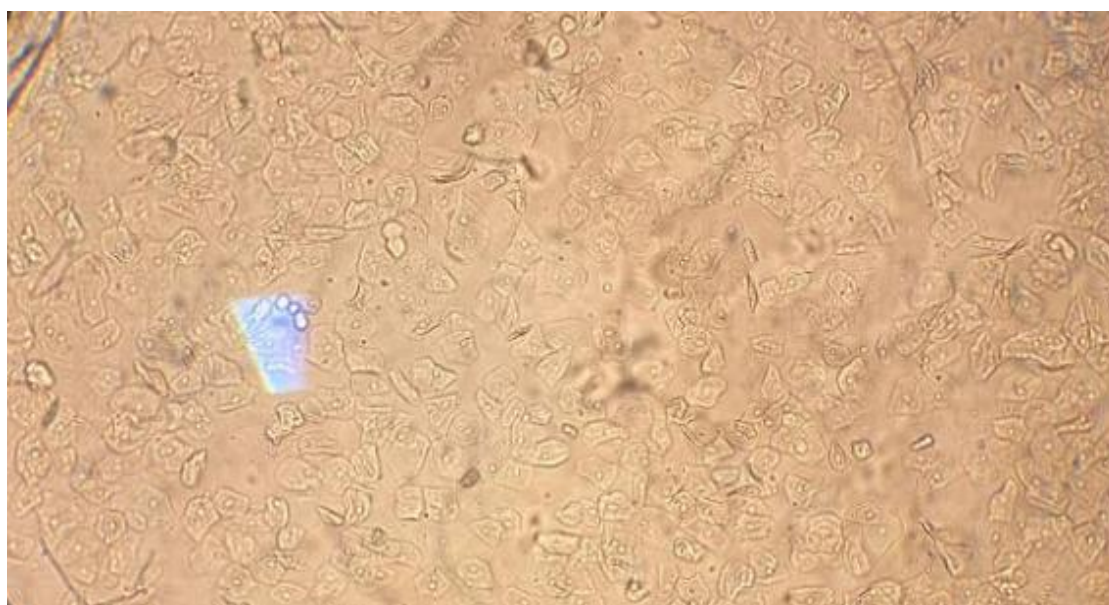


Figure 5. The presence of epithelial cells in the urine sediment in the patients in the study (Photo taken from the biochemical laboratory of the Clinical Hospital-Tetove 2022)

5. Conclusion and Discussion

The obtained results show that urine and urinary infections are the main indicators of urinary tract infections in patients with acute and chronic infections as well as asymptomatic patients who have had no clinical symptoms.

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 (K.N. Shaw, K.L. McGowan, 1998). Carl et al. 2015 study 2100 persons by means of dipstick screening, which revealed that at least 10% of people showing a single urinary tract deviation.

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.

Patients of both sexes, both men and women, are attacked with urinary infections and the main indicator of the excretory organs are the kidneys, which we must be careful and more frequent routine analyzes and in the early identification and timely treatment of these infections so as not to lead to the biggest pathologies of the kidneys.

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The recommendation of doctors for routine urine analysis of patients would be a preventive measure for greater care in major infections of the lower and upper tracts of the excretory organs.

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