

# Urine Analysis as a Screening Tool in Early Detection of Renal Abnormalities in Asymptomatic Female

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**Abstract:** ***Background:** Urine examination by urine dipstick method is a useful tool to identify asymptomatic individual for kidney disease. Chronic kidney disease goes through several stages before its symptoms appear, most people may not notice these symptoms until they find themselves facing advanced stages of the disease so urine analysis was conducted to determine the urine abnormalities among asymptomatic female college students. **Methods:** A cross - sectional study was carried out in a female college at Jazan University in KSA. Fifteen asymptomatic female students participated in this study. Fresh midstream urine samples were obtained and tested by urine dipstick method and microscopic examination. Renal function tests including urea, creatinine, and uric acid were performed on participants who show any abnormalities. **Results:** Seventeenth participants (34%) were found positive for proteinuria, and five participants (10%) have ketonuria. Hematuria was present in 14% of participants while 16 % and 13% of participants were positive of erythrocyte and leukocyte esterase dipstick. Microscopic examination showed Pyuria (18females, 36.4%), amorphous phosphate crystal (15females, 30%), and hematuria (14females, 7%). **Conclusion:** Urinary abnormalities like proteinuria, hematuria, and ketonuria in asymptomatic female students have significant prevalence. Pyuria and amorphous phosphate crystal have significance alarming among asymptomatic femaleshence early screening tests of urinalysis may possibly reduce the burden of renal abnormalities and renal disease.*

**Keywords:** Female students, hematuria, proteinuria, screening, urinalysis.

## 1. Introduction and Litterer Review

Chronic kidney disease (CKD) is a global epidemic with an increasing prevalence worldwide, affecting 753 million people globally in 2016 which defined as any disorder that results in decreased kidney function and kidney damage over a minimum of three months and having glomerular filtration rate (GFR) of less than 60 mL/per 1.73 m<sup>2</sup> of body surface area. <sup>(1)</sup>

The hallmark symptoms of CKD are the loss of functioning nephrons and the increasing degradation of renal parenchyma. These changes cause molecular and cellular processes that cause the few remaining viable nephrons to expand in response, which lowers urine excretion of creatinine and other metabolic wastes. These pathways may evolve into pathological conditions that cause kidney lesions to form and eventually culminate in end - stage renal disease. <sup>(2)</sup>

In clinical practice, impaired kidney function is estimated by using the glomerular filtration rate (GFR), serum levels of creatinine and cystatin C, and the presence of albumin in urine. <sup>(3)</sup>

Unfortunately, CKD in its earliest stages is usually an asymptomatic condition that progresses to its end stage over a period of several years and is diagnosed late in its course which has asignificant effect on the healthcare system, thus finding risk factors or relevant biomarkers can help reduce these effects and offer the chance to start treatment before the emergence of many co - morbid conditions. <sup>(4)</sup>

One of the early markers of renal disease is proteinuria. Clinically significant proteinuria is not only a useful early marker of renal disease, but it also serves as an index of disease severity and a determinant of disease progression. <sup>(5)</sup>

Globally, the prevalence of proteinuria was 5%–15% and the common manifestations of kidney disease that have a serious impact on the progressive deterioration of kidney function, a

multi - assessment study conducted in Indonesia 2015 on students aged 12 - 14 proteinuria accounted for 7.42% and the study show prevalence of asymptomatic persistent proteinuria among adolescent students in Jakarta is higher than that in other populations in Asia. <sup>(6)</sup>

Between March 2001 and August 2003, 1, 044 children, aged 6 to 18 years, were identified with hematuria and/or proteinuria during a mass school urine screening test by pediatric nephrologists at 13 hospitals in Korea. These children had hematuria (60.1%), proteinuria (26.4%), or combined hematuria and proteinuria (13.5%) researchers conclude that hematuria when co - existing with proteinuria correlated well with the severity of the morphological glomeruli alterations in the symptomless school - age population. <sup>(7)</sup>

Since 1973 a urine screening program has been carried out in Japan for the early detection of chronic kidney disease (CKD) while compulsory implemented in South Korea for elementary school children since 1998. <sup>(8)</sup>

A 2008 study in the eastern part of Turkey found that 1848 healthy school - age children (7 to 14 years old) had an incidence of hematuria and proteinuria. The researchers concluded that patients with persistent hematuria and/or proteinuria should be evaluated, particularly in terms of renal stones, hypercalciuria, and urinary tract infection which is similar to the findings in a Lebanese study 2010 on 870 students among all the students, hematuria was the most common abnormality (1.5%) followed by nitrituria (0.45%), combined hematuria and nitrituria (0.45%) and proteinuria <sup>(6)</sup> and a study conducted on 579 high school student on Nepal 2016 found that there is a high burden of proteinuria (>12%) indicated asymptomatic urine abnormalities. <sup>(9)</sup>

A cross - sectional study on 401 students was conducted in Jeddah, Saudi Arabia 2015 investigated urine abnormalities and found (10.2%) of samples were positive for proteinuria, (17%) for hematuria, and (3.1%) for both. <sup>(10)</sup>

A total of 209 patients mean age 46.32 years Urinalysis alterations were observed in 28.29% of patients thus researchers concluded the use of urine reagent strips in kidney disease screening through proteinuria assessment in a random population is an important tool for diagnosis and subsequent follow - up to a nephrologist. <sup>(11)</sup>

With this background, the present study aimed to detect the prevalence of renal disorders and risk factors related to them, with spotlight on the role of urine screening in the early detection and prevention of progressive renal diseases in a healthy person.

## 2. Materials and Methods

A cross sectional observational study was conducted in Jazan city of South of Kingdom Saudi Arabia. The duration

of the study was 1 year from 2022 to 2023. Totally 50 asymptomatic females from Jazan University were enrolled. A multistage random sampling method was adopted for the selection of females. Apparently, healthy females from the age of 18 - 65 years were selected for the study. Females with known renal disorders or any other systemic disease were excluded from this study. The screening tool included a questionnaire documenting historical data together with onsite measurements of urine dipstick for detection of any abnormalities in chemical constituents of urine and microscopic examination for detection of any cellular and abnormal crystal in urine besides determination on renal function test in positive females that show significant abnormalities. The urine sample was obtained from each female in a clean 50 mL vessel, which was tested with a urinary dipstick for urinary abnormalities as the first screening test. Microscopic urine analysis Urine was centrifuged and sediment was taken, the number of leucocytes and bacteria per high power field were recorded, RBCs count, then RBC morphology was examined for positive cases of hematuria. An RBC count of five or more per high power field was considered hematuria. Any abnormalities were further evaluated. The statistical analysis was performed using SPSS version 16.0 were applied to detect the percentages of all parameters.

## 3. Results

Consent forms were given to 50 asymptomatic females in aged 18 - 60 years. Thus, the screening urinalysis was performed on them. In the dipstick screening, we found (34%) 17 proteins, (10%) 5 ketones, 8 (16%) erythrocytes, and 13 (26%) leukocytes (figure 1). some subjects had more than one abnormality detected in microscopic examination pus cells had the highest prevalence detected (36.4%) and amorphous phosphate (30%) Hematuria was (14%). (Figure 2).

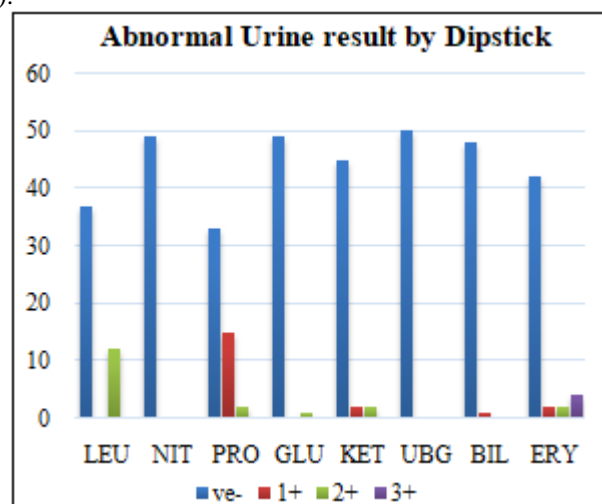


Figure 1: Dipstick result

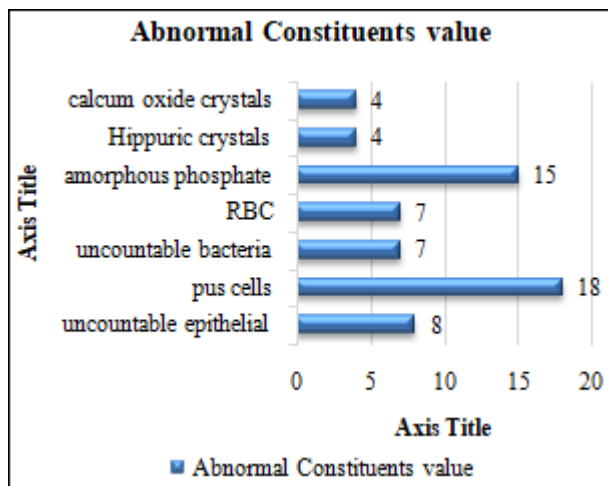


Figure 2: Microscopic result

The results of the questionnaire given to the participants to find out the possible causes of renal disorders, according their answer our findings were shown in figure 3

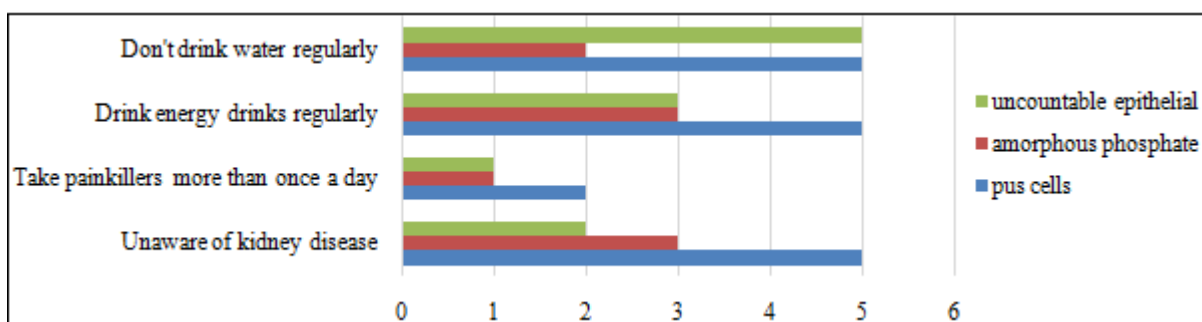


Figure 3: The results of questionnaire and some microscopic characteristic

After Reconnect with the participants who had positive result in dipstick and microscopic examination, 20 serum sample was examined for evaluation of renal function tests (urea, creatinine and uric acid) and the result was shown 6 participants had high uric acid (1.2%), 2 of participants had high creatinine (0.4%) and only 1 participant had high urea level (0.2%)

(Table 1) urea, creatinine, uric acid result.

Sample no	urea	creatinine	Uric acid
1	49 mg/dl	1.0 mg/dl	3.0 mg/dl
3	30 mg/dl	0.7 mg/dl	6.1 mg/dl
4	37 mg/dl	0.5 mg/dl	6.0 mg/dl
6	66 mg/dl	0.8 mg/dl	3.1 mg/dl
10	23 mg/dl	0.7 mg/dl	4.5 mg/dl
12	42 mg/dl	0.9 mg/dl	3.7 mg/dl
13	43 mg/dl	0.4 mg/dl	3.3 mg/dl
19	39 mg/dl	0.5 mg/dl	4.1 mg/dl
23	38 mg/dl	0.8 mg/dl	5.6 mg/dl
28	35 mg/dl	0.7 mg/dl	2.7 mg/dl
30	29 mg/dl	0.6 mg/dl	2.4 mg/dl
31	33 mg/dl	0.7 mg/dl	3.2 mg/dl
35	42 mg/dl	0.8 mg/dl	9.9 mg/dl
24	18 mg/dl	0.9 mg/dl	7.0 mg/dl
53	19 mg/dl	0.9 mg/dl	9.8 mg/dl
43	17 mg/dl	0.6 mg/dl	4.5 mg/dl
37	27 mg/dl	0.9 mg/dl	9.2 mg/dl
46	28 mg/dl	1.0 mg/dl	8.8 mg/dl
33	37 mg/dl	0.5 mg/dl	9.8 mg/dl
46	49 mg/dl	0.8 mg/dl	3.7 mg/dl

#### 4. Discussion

In search of abnormal sustenance protein and erythrocyte by dipstick and under the microscope found pus cell, amorphous phosphate, and uncountable epithelial. Predictors of end - stage renal disease programs have been studied in long - term perspective studies such as the Okinawa screen, the multiple risk factor intervention Trial, and the Norwegian study. In a 10 - year follow - up of the Okinawa population, proteinuria, hematuria, and hypertension were identified as predictors of end - stage renal disease program. In our search, we found 34 % protein and 12 % of urine erythrocytes. In a cross - sectional study in 2010, Hajar et al. investigated the prevalence of blood in the urine of primary school students through dipstick testing. Among all students, hematuria was the most common disorder with a prevalence of 1.5%. we found 12% of urine erythrocytes and the relationship between question answered people and some abnormal constituents of microscopic urine The answer is Don't drink water regularly 5% uncountable epithelial, 2.8% amorphous phosphate, and 4.5 % pus cell. To ascertain whether water is beneficial for the kidneys, researchers conducted another study on 1265 participants, who suffer from chronic kidney disease, and the duration of the study was 3 years. The results of the study showed as follows: The concentration of substances in the urine decreased from 374 ml/L to 326 ml/L. Decreased renal filtration rate (creatinine) in the urine. Individuals who drink less water per day, less than 0.5 liters per day, or who drink more water more than 2.0 liters per day, are more likely to develop kidney disease,

compared to those who drink moderate amounts of water, at a rate of 1.0 - 2.0 liters / Daily. Taking painkillers more than once a day found 2% pus cells and Overuse of painkillers can be dangerous to the kidneys.

## 5. Conclusion and Recommendation

### 5.1 Conclusion

The data in this study was presented that 50 samples were taken from female students and workers in Jazan University, during the academic year 2022 to 2023 the results were 37 negative results, (74%), and 13 positive results, (26%). Also, the answers to the questions show that 78% of females in the university had an awareness of kidney disease.

### 5.2 Recommendation

- Advise people not to take more than 3 cups of coffee a day because of its damage to the kidneys.
- Drink the appropriate amount of water according to weight and physical activity.
- Do not overuse painkillers, it can be dangerous for the kidneys.
- Do not take energy drinks.

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