Lab-7- Urinalysis

-It can detect diseases which pass unnoticed

- Diagnosis of many renal diseases

- Screening for drug abuse (e.g. Sulfonamide or aminoglycosides).

Collection of urine specimens

For most of the routine investigations fresh midstream specimen of 10- 20ml urine is collected in a clean dry vial . Analysed within 2hours of collection In some cases 24hour urine sample is also collected

Types of specimens

-Random specimen (at any time)

-First morning specimen

-Clean catch sample (midstream urine)

Urinalysis look of :

A-physical Examination

1-Volume

2-Color

3-Odor

4-Reaction (pH)

5-Specific gravity

B-Chemical analysis

C-Microscopic Examination

A-physical Examination

1-Volume

Adult urine volume= 0.6-2.5 L/day

average 1.5 L/day

Children urine volume= 0.2-0.4 L/day

The volume of urine is affected by:

1)Water intake

2) External temperature

3) Type of diet

4) Mental and physical state

5) Cardio-Vascular status

6) Intake of fluid and diuretics (drugs, alcohol and tea)

7) Renal functions

Variations in volume of urine excreted

**A-Polyuria B-Oliguria C- Anuria**

A-Polyuria

(Urine output > 2.5 L/day )

 **Conditions causing polyuria:**

1-Increased water ingestion 2-Diabetes mellitus and insipidus

3-Late stage of chronic glomerulonephritis 4-Drug induced-diuretics

5-Alcohol 6-Compulsive polydipsia

B-**Oliguria**

(Urine output < 0.4 L/day )

**Conditions causing Oliguria:**

1-Fever 2-Diarrhea and Dehydration

3-Shock 4-Sever edema

5-Acute nephritis 6-Early stage of acute glomerulonephritis

7-Cardiac failure and hypotension (reduced circulatory volume )

Color

The color of normal urine may vary from pale yellow to dark amber due to the presence of pigment surochrome ,urobilin and uroerythrin

Turbidity may because by excessive cellular material or protein in the urine or may develop from crystallization

Color of urine depending upon its constituents

Variations in urinary abnormal colors Interpretation

Color

Very dilute urine (Diabetes and polyuria) Colorless

Concentrated urine, Excess bile pigments and Jaundice Deep yellow

Carrots or Vitamin A Orange

RBCs ,Myoglobin ,beetroot and menstrual contamination Red/smoky

Pseudomonas infection Blue-Green

Iron therapy Black

Pus cells and bacteria Cloudy



Odor

Normal urine has an aromatic odor due to the volatile fatty acid. Interpretation Odor

On keeping sample for a long time Ammonia

Due to bacterial infections Foul or offensive

Due to acetone(Diabetic urine) Fruity

Phenylketonuria Mousy

Tyrosinaemia Rancid فاسد

pH

Urine pH range from 4.5 to 8

Normally it is slightly acidic lying between 6-6.5

Acidic urine :

seen in

1-Ketosis (such as diabetes, starvation and fever )

2-Systemic acidosis

3-Urinary tract infections (UTI)-E. coli

4-Acidification therapy

Alkaline urine :

seen in

1-Diet rich in citrus fruits

2-Excessive intake of milk and antacids

3-UTI

4-Conditions of alkalosis

4-Specific gravity (SG)

It is measurement of urine density which reflects the ability of the kidney

to concentrate or dilute the urine relative to plasma from which it is filtered

Measured by dipsticks

The normal SG of urine ranges from 1.001to1.035



**Normal urine abnormal urine**

Lab-8- **Microscopic examination of urine**

Requirements:

1-Centrifuge tube or test tube 2-Glass slide 3-Coverslips

4-Pasteur pipettes 5-Centrifuge 6-Microscope 7-Sample

\*Principle:

The microscopic elements present in urine are collected in the form of deposit by centrifugation .A small drop of the sediments poured on a glass slide ,a cover slip is place over it and observed under microscope. A variety of normal and abnormal cellular elements.

1-Red blood cells or Erythrocytes (RBCs)

2-White blood cells (WBCs)

3-Mucus

4-Different types of epithelial cells

5-Different types of Crystals

6-Casts

7-Bacteria

8-Fungi

9-Parasite

10-Artifacts

1- Red blood cells or Erythrocytes (RBCs)

•Hematuria is the presence of abnormal numbers of red cells in urine due to any of several possible causes:

Glomerular damage , Kidney trauma , Urinary tract stones , Urinary tract infections

, Physical stress .

In fresh urine these cells have a normal ,pale or yellow appearance ,they do not contain nuclei**.**



2- White blood cells (WBCs)

•Pyuria refers to the presence of abnormal numbers of WBCs that may appear with infection in the urinary tract**.**



**WBCs have lobed nuclei and granular cytoplasm**

3- Mucus

•A protein material produced by the glands and epithelial cells of lower genitourinary tract and the renal tubular epithelial (RTE)



**4- epithelial cells**

**Different types of epithelial cells**

A-Squamous epithelial cells



These are large ,flat and irregular in shape and contain abundant cytoplasm and

small central nuclei

B-Transitional epithelial cells



-They may be pear shaped or round C-Tubular epithelial cells

-They may be round shaped or egg-shaped



These cells may contain a large round or oval nucleus