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Research Article

A STUDY ON ABNORMAL CONSTITUENTS OF URINE IN DIABETIC PATIENTS

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ABSTRACT

Aim: To study the Abnormal Constituents of urine in Diabetic Patients.

Objective: Many substances such as glucose, proteins, amino acids, etc are present in trace amounts in normal urine, presence of these substances is suggestive of underlying pathological condition, and other diseases like diabetes.

Materials and Methods: To identify urinary sugar Benedicts Test, for ketone bodies Rotheras Test.

Results: Ketone bodies are elevated in hyper glycemc condition.

Keywords: Diabetes mellitus, abnormal constituents, diabetic ketoacidosis,

INTRODUCTION

Urine is the excretory waste product formed by the kidney. It reflects the overall metabolic and kidney functions of the body. Its analysis, therefore, is important in evaluating kidney functions as well as in the diagnosis of many other diseases. Urine of normal healthy individuals has definite physical properties and chemical composition. However in many diseases the properties of urine and its composition changes. Several new metabolites indicating the presence of specific which do not appear in urine. Such metabolites which do not appear normally in urine are called abnormal constituents. In normal urine sample many substances such as glucose, proteins, amino acids, etc are present in trace amounts. They escape detection due to the low sensitivity of the tests employed. An increase in urinary output occurs in diabetes mellitus and diabetes insipidus, or after administration of certain drugs like digitalis, salicylates or diuretics¹ Diabetes mellitus (DM) also known as simply diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period². This high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger. Untreated, diabetes can cause many complications³. Acute complications include diabetic ketoacidosis and nonketotic hyper osmolar coma⁴. Serious long-term complications include heart disease, stroke, kidney failure, foot ulcers and damage to the eyes³. People (usually with

type 1 diabetes) may also experience episodes of diabetic ketoacidosis, a type of metabolic problems characterized by nausea, vomiting and abdominal pain, the smell of acetone on the breath, deep breathing known as Kussmaul breathing, and in severe cases a decreased level of consciousness¹⁸. Ketones in urine: When ketones are found during a urine test, further investigation is required to ascertain your true health status. Using a urine test is a quick and inexpensive way to check for ketones in your urine, and is one of our test kit products that can be done in the privacy of your home.

MATERIALS AND METHODS

In diabetes mellitus mainly glucose and ketone bodies are elevated. For detecting these substances first collect the urine sample from diabetic patients.

How the Test Is Performed

The test requires a clean catch urine sample.

To obtain a clean catch sample, men or boys should clean the head of the penis. Women or girls need to wash the area between the lips of the vagina with soapy water and rinse well. As you start to urinate, allow a small amount to fall into the toilet bowl to clear the urethra of contaminants. Then, put a clean container under your urine stream and catch 1 to 2 ounces of urine. Remove the container from the urine stream. Cap and mark the container and give it to the health care provider or assistant.

For infants, thoroughly wash the area around the urethra. Open a urine collection bag (a plastic bag with an adhesive paper on one end), and place it on the infant. For boys, the entire penis can be placed in the bag and the adhesive attached to the skin. For girls, the bag is placed over the labia. Diaper as usual over the secured bag.

This procedure may take a couple of attempts -- lively infants can displace the bag. The infant should be checked frequently and the bag changed after the infant has urinated into the bag. The urine is drained into the container for transport to the laboratory.

Urine ketones are usually measured as a "spot test" using a dipstick coated with chemicals that react with ketone bodies. The dipstick is dipped in the urine sample, and a color change indicates the presence of ketones.

How to Prepare for the Test

You may have to eat a special diet, and you should stop taking any drugs that may affect the test.

If the collection is being taken from an infant, you may need extra collection bags.

How the Test Will Feel

The test involves only normal urination, and there is no discomfort.

Why the Test Is Performed

Ketone testing is most often done if you have type 1 diabetes and:

- Your blood sugar is higher than 240 mg/dL
- You have an illness such as pneumonia, heart attack, or stroke
- Nausea or vomiting occur
- You are pregnant^[19]

TEST FOR GLUCOSE

Urine test

- Collect a urine sample in a clean container.
- Follow the manufacturer's directions on the bottle of test strips or tablets.

Avoid getting toilet paper, pubic hair, stool, menstrual blood, or other foreign matter in the urine sample.

This is detected by Benedicts test

TEST FOR GLUCOSE

TEST	OBSERVATION	INFERENCE
Benedicts test: 5ml of benedicts reagent and 8 drops of urine.Boil for 2 minits over a small flame.	Light green,yello,orange or brick red ppt is seen	Presence of reducing sugars in general especially glucose the colour is suggestive of apporoximate amount of glucose in urine.(green 0.5%,yellow 1%,orange 1.5%, brick red 2%)and is due to the formation of enediol in alkaline medium which reduces Cu++ to CuOH and than to CuO ^[1] .

TEST FOR KETONE BODIES.

Urine test

- Collect a urine sample in a clean container.
- Follow the manufacturer's directions on the bottle of test strips or tablets.

Avoid getting toilet paper, pubic hair, stool, menstrual blood, or other foreign matter in the urine sample.

Acetone, acetoacetate and β-hydroxy butyric acid are know as ketone bodies.Rotheras testis a test of ketones and hence detect the presence of acetone and acetoacetate which have ketone groups. In Rotheras test sodium nitroprusside reacts with ketones forming a purple coloured complex in presence of ammonia.

TEST FOR KETONE BODIES

TEST	OBSERVATION	INFERENCE
Ketone bodies : Rotherastest : 5ml of urine is saturated with solid ammonium sulphate, a little at a time with mixing to saturate the solution. Add a pinch of sodium nitro prusside. Mix gently and add 1ml of strong NH3 drop wise along the side of the test tube.	Permanganate pink coloured ring is formed at the junction.	Presence of acetone, aceto acetic acid. ^[1]

RESULTS

Positive Benedicts test usually indicates glucose. When performed by taking benedicts reagent and urine sample in specific ratio of 5ml and 8.0 drops respectively,the test becomes semi quantitative i.e it indicates the amount of sugar present in urine sample depending upon the colour.g .Green colour – upto 0.5g%, Green ppt, - 0.5-1g%, Yello ppt – 1-1.5g%,Orange ppt – 1.5-2g%,Red ppt – >2g%^[1].

Normal Results For ketone bodies

A negative test result is normal.

Normal value ranges may vary slightly among different laboratories. Some labs use different measurements or test different samples. Talk to your doctor about the meaning of your specific test results.

What Abnormal Results Mean

An abnormal result means you have ketones in your urine. The results are usually listed as small, moderate, or large as follows:

- Small:
- Moderate: 30 - 40 mg/dL
- Large: > 80 mg/dL^[19]

DISCUSSION

Positive Benedict's test usually indicates glucose. Glucosuria occurs mainly during diabetes mellitus and renal diabetes. Positive reaction can also be seen due to lactosuria in pregnancy and lactation, due to galactose in galactosuria, pentose in pentosuria, etc and the identification of different sugars may be established by other relevant tests.

Acetone, acetoacetate and β -hydroxy butyric acid are known as ketone bodies. These ketone bodies are present in the urine; this may be due to diabetic ketoacidosis, a problem that occurs in people with Type 1 diabetes. It occurs when the body cannot use sugar (glucose) as a fuel source because there is little or no insulin. Fat is used for fuel instead.

An abnormal result may also be due to:

- Abnormal food or nutrition intake due to:
- Anorexia
- Fasting
- High protein or low carbohydrate diets
- Starvation
- Vomiting over a long period of time
- Disorders of increased metabolism
- Acute or severe illness
- Burns
- Fever
- Hyperthyroidism
- Nursing a baby (lactation)
- Pregnancy

CONCLUSION

Urine is the excretory waste product formed by the kidney, it reflects the overall metabolic and kidney functions of the body. Its analysis, therefore, is important in evaluating kidney functions as well as in the diagnosis of many other diseases. In diabetes mellitus glucose and ketone bodies are elevated; that condition is called as Diabetic keto acidosis.

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