



Retrospective analytical study of ketonuria in patients attending tertiary care hospital

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ABSTRACT

Introduction: The ketonuria usually occurs in it's a severe form as a complication of diabetic keto acetosis. The occurrence of ketonuria is not however confined to diabetic persons alone. The non diabetic keto acetosis may threaten life and also require effective diagnosis treatment especially in children and young persons. In adults the non diabetic ketonuria is rare and seen in conditions like starvation, severe dehydration, vomiting, diarrhea, fever, weight reduction, thyrotoxicosis and in certain severe metabolic disorders. **Aim of the study:** The observation of the study and understanding of the value urinary ketonuria in relation to various conditions and its prevalent in identifying the patient under risk. That is in both diabetic and non diabetic, both sexes, both children and adults. **Material and methods:** Estimation of urinary ketone bodies by means of commercially available ketone bodies urinary dipstick which reacts by sodium nitroprusside method and also the positive cases are counter checked by means of manual urinary sodium nitroprusside test for ketone bodies. Dipstick is associated with considerable risk of false positive and false negative when some drugs are present in the urine or dipstick is exposed to air for longer time. **Observation and Discussion:** In our study, Majority of cases faces between the age group 20-60 yrs (85% of which more than 31% of the cases between age group of 40-50 years. And sex wise more than 58% of cases are females and males 42% Paediatric age group less than 12 years is 7% of which females constitutes 5 cases females and 3 cases of males. Out of 87 cases post surgical cases constitutes 13 cases and fever cases constitutes 31. out of 8 cases of pediatric age group 6 of them are fever with dehydration and 2 cases are with gastritis with vomiting. Out of 87 cases, 28 cases are diabetic and rest of them are non diabetic patients. All the 8 paediatric cases are presenting ketonuria are non diabetic.

Diabetic cases constitutes 24 and other cases 10. Out of 87 ketonuria positive cases 28 DM rest 59 cases non diabetic constitutes. **Conclusion:** In our study of ketonuria cases, most of them are non diabetic adult females presenting with fever and post surgical cases.

Aim of the study

The observation of the study and understanding of the value urinary ketonuria in relation to various conditions and its prevalent in identifying the patient under risk. That is in both diabetic and non diabetic, both sexes, both children and adults.

Inclusion criteria: All patients attending clinical laboratory for routine urine test in tertiary care hospital

Exclusion criteria: Nil

Introduction and Background

The ketonuria usually occurs in it's a severe form as a complication of diabetic keto acetosis. The occurrence of ketonuria is not however confined to diabetic persons alone. The non diabetic keto acetosis may threaten life and also require effective diagnosis treatment especially in children and young persons. In adults the non diabetic ketonuria is rare and seen in conditions like starvation, severe dehydration, vomiting, diarrhea, fever, weight reduction, thyrotoxicosis and in certain severe metabolic disorders.

However the ketonuria is of less severe degree and compare to children.

The ketosis result from insufficient metabolism of glucose which is followed by increased oxidation of fatty acid for the energy requirement. As a result there is excess formation of aceto acitic acid which is normally oxidized by

simultaneous glucose oxidation resulting in conversion of ketone bodies to acetone and aceto acitic acid which on complete oxidation converted to CO_2 and H_2O excess ketone bodies is excreted in breath and urine. The simultaneous metabolism of definite proportion of fatty acid to glucose ratio exceeds 1.5 – 2. The excess ketone bodies (aceto acitic acid & hydroxyl buteric acid) are appears in the urine.

The ketolytic function of glucose is variable and there are many modifying influences. The ketolytic action of glucose in children is less affective when compared to adults. So hence during fasting and high fever with acute infections the blood sugar decline rapidly to the lower level in children when compare to adults resulting in ketonuria. The energy is applied largely by metabolism of fact due to restricted carbohydrate intake. The energy is derived from storage glycogen. This mechanism is less effective in children suffering from glycogen storage disorders. The children readily excrete ketone bodies in the urine by metabolism of mixed fatty acid to glucose metabolic ratio 0.7. Thus, the threshold for ketosis is less and compare to others.

Clinical manifestation of ketosis varies in severity from slight drowsiness to severe coma or convulsions and in milder forms there is drowsiness or somnolence may be the only sign and it may recover even without treatment. Occasionally the slight drowsiness of the sensorium becomes dull progressing to deep coma. The clinical features show flushed face, red lips, air hunger, tissue dehydration, acetone breath and severe prostration. This clinical features are same as that in diabetic ketotic coma. These serious symptoms are not gradual in onset. But appears suddenly within few hours depending on the individual susceptibility and the rate of metabolic defects and pronging conditions (high fat rich diet), diminish liver function in the presence of acute infections and fever. Thus the susceptible persons have a greater tendency to burn fat than the normal person. The ketosis impairs acid base balance of the body leading to acidosis. So some degree of ketosis is fully compensated. The protective mechanism composed of formation of organic base ammonia leading to conservation of fixed base and elimination of carbon dioxide by lungs and excretion of acid in the urine.

Starvation preceding and following surgical operations especially in presence of febrile post operative period is a frequent cause for severe ketosis. The anesthetic agents can cause added influence on ketonuria.

The diabetic keto acidosis is a life threatening complication of diabetic mellitus. It response to prompt diagnosis and treatment and it characterized by bio chemical triad of hyperglycemia, hyperketonemia – Ketonuria and metabolic acidosis which leads to severe metabolic deterioration. In DKA there is absolute or relative insulin deficiency and simultaneous increase in circulating counter regulatory hormones especially glucagon caused by stressful conditions. Example, acute infections, drugs, fever, etc. which enhances lipolysis in adipose tissue and ketogenesis in the liver.

The aceto acitic acid and β -hydroxy buteric acid are the important ketone bodies which are strong organic acids which completely dissociate the physiological pH resulting in metabolic acidosis. This is evaluated by estimation of urinary or blood ketone bodies. By means of semi quantitative ketone test (Nitroprusside – reactive dipstick).

MATERIAL AND METHODS

Estimation of urinary ketone bodies by means of commercially available ketone bodies urinary dipstick which reacts by sodium nitroprusside method and also the positive cases are counter checked by means of manual urinary sodium nitroprusside test for ketone bodies. Dipstick is associated with considerable risk of false positive and false negative when some drugs are present in the urine or dipstick is exposed to air for longer time.

Rothras test (Classic nitroprusside reaction)

Acetoacetic acid or acetone reacts with nitroprusside in alkaline solution to form a purple colored complex Rothera's test is sensitive to 1 – 5mg/dl of acetoacetate and to 10-25 mg/dl of acetones.

METHOD

1. Take 5ml of urine in a test tube and saturate it with ammonium sulphate.
2. Add a small crystal of sodium nitroprusside. Mix well
3. Slowly run along the side of the test tube liquor ammonia to form a layer.
4. Immediate formation of purple permanganate colored ring at the junction of the two fluids indicates a positive test

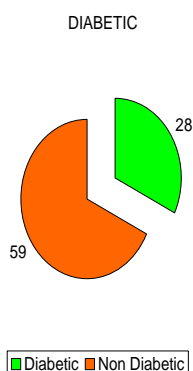
False positive test can occur in the presence of L-dopa in urine and in phenylketonuria.

RESULTS

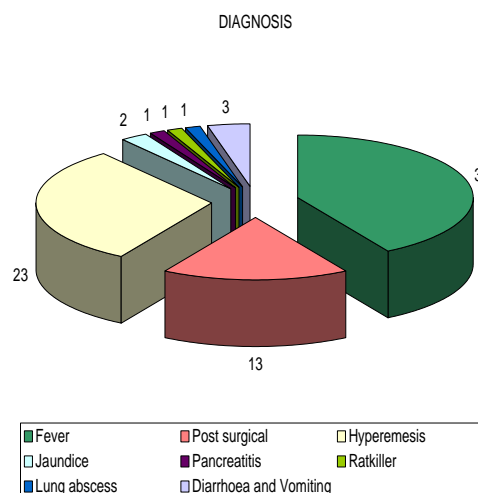
Age in years	No. of cases	Percentage
< 12	7	8.0
13 - 25	10	11.5
26 - 50	45	51.7
51 - 75	22	25.3
> 75	3	3.4
Total	87	100.0

Sex	No. of cases	Percentage
Male	37	42.5
Female	50	57.5
Total	87	100.0

Diabetic	No. of cases
Diabetic	28
Non Diabetic	59
Total	87



Diagnosis	No. of cases
Fever	31
Post surgical	13
Hyper emesis	23
Jaundice	2
Pancreatitis	1
Ratkiller	1
Lung abscess	1
Diarrhoea and Vomiting	3
Others	12



Age in years	Trace positive	Positive
< 12 (7)	0	7
13 - 25 (10)	0	10
26 - 50 (45)	2	43
51 - 75 (22)	1	21
> 75 (3)	1	2
Total	4	83

Sex	Trace positive	Positive
Male (37)	2	35
Female (50)	2	48
Total	4	83

OBSERVATION AND DISCUSSION

In our study, Majority of cases faces between the age group 20-60 yrs (85% of which more than 31% of the cases between age group of 40-50 years).

And sex wise more than 58% of cases are females and males 42%

Paediatric age group less than 12 years is 7% of which females constitutes 5 cases females and 3 cases of males.

So totally pediatric age groups constitutes less than 10% of the total cases.

Out of 87 cases 83 shows strong positive of ketonuria, 4 cases shows weak positive.

Out of 83 ketonuria, positive cases females constitutes 48 and males constitute 35 and trace positive cases female 2 cases and male 2 cases.

Out of 87 cases post surgical cases constitutes 13 cases and fever cases constitutes 31. out of 8 cases of pediatric age group 6 of them are fever with dehydration and 2 cases are with gastritis with vomiting.

Out of 87 cases, 28 cases are diabetic and rest of them are non diabetic patients.

All the 8 paediatric cases are presenting ketonuria are non diabetic.

Diabetic cases constitutes 24 and other cases 10

Out of 87 ketonuria positive cases 28 DM rest 59 cases non diabetic constitutes.

CONCLUSION

In our study of ketonuria cases, most of them are non diabetic adult females presenting with fever and post surgical cases.

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