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Serum Ammonia Levels as a Prognostic Predictor in Hepatic Encephalopathy.

Medicine

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ABSTRACT

Aim - To study the serial changes in serum ammonia level in a patient of liver disease with neuropsychiatric manifestation and prognostic predictor in hepatic encephalopathy.

Material and Methods :- 59 diagnosed cases of lives cell dysfunction admitted to medical college at Kolhapur were studies with prospective study. Clinical features, lab parameter mainly serum ammonia levels and outcome were evaluated in all patients with hepatic encephalopathy.

Results :- Among 59 cases of hepatic encephalopathy 11% were hyperacute,48% were acute,24% were sub acute and 15% chronic cases. And in these cases serum ammonia levels were seen higher in hyper acute and acute stages whereas in subacute and chronic cases it goes on reducing.

Conclusion:- Levels of serum ammonia level below 87µmol/lit is the prognostic indicator and high chances of improvement. Levels above 115µmol/lit have irreversible prognosis and mostly found in comatose state.

KEYWORDS:

serum ammonia, encephalopathy, liver diseases.

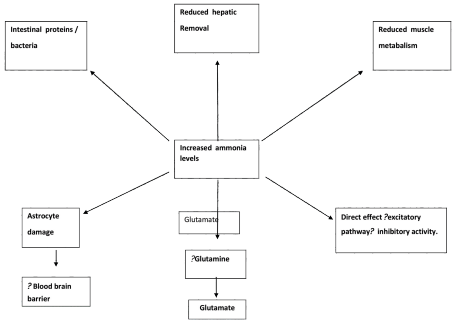
Introduction

Hepatic encephalopathy is the term applied to wide range of neuropsychiatry changes in patients with significant liver dysfunction. Dysfunction of liver may be

1) Acute / fulminant
2) Major portosystemic bypass of liver.
3) Chronic liver disease / cirrhosis.
4) Clinical picture of hepatic encephalopathy is complex and affects all parts of brain. There are neurological and psychiatric components. Variability between patients is a marked feature.

Most ammonia levels in the body forms when protein is broken down by bacteria in the intestines.(9) The liver normally converts ammonia into urea, which is then eliminated in urine. Ammonia levels in the blood rise when the liver is not able to convert ammonia to urea. This may be caused by cirrhosis or severe hepatitis(1). The implication of ammonia in the pathogenesis of hepatic encephalopathy is based on four sets of observation.

1) Blood ammonia levels are elevated in patients with hepatic encephalopathy.
2) Precipitating factors of hepatic encephalopathy results in hyperammonemia.
3) Induction of hypothesis in animal studies.
4) Treatments to lower serum ammonia improves stages of encephalopathy.Glutamate



In acute and chronic liver disease increased ammonia levels are seen. In fulminant hepatic failure, elevated arterial levels above 200 microgram/dl have been as associated with an increased risk of Cerebral herniation(4). Normal value of 11 micromol/dl to 35 are reported for enzymatic procedure.

Hepatic encephalopathy has been graded by West Haven criteria(2) as

Grade 0- No abnormality,no flapping tremor.
Grade 1- Lack of awareness, altered sleep pattern, shortened. attensionspan, asterixis may be.

Grade 2- Lethargy, disorientation, inappropriate behavior, Slurred speech and obvious asterixis(3).

Grade 3- Gross disorientation,bizarrebehaviour,stupor,absent asterixis.

Grade 4- Coma
In this study serum ammonia level are help for early diagnosis and prognosis of hepatic encephalopathy. High levels of ammonia in the blood may be caused by; liver disease, such as cirrhosis or hepatitis, Reye Syndrome, heart failure causing congestion of liver, kidney failure, severe bleeding from the stomach or intestines.(5,6,7)

Material and Methods:

After informed consent from patients attendant and ethical clearance from ethical committee a prospective observational study was conducted on 59 patients of hepatic cell failure. All patients were diagnosed with detailed history and laboratory testing including serial levels of serum ammonia levels on 1st day, 3rd day and 5th day of diagnosis. Both arterial and venous sample can be used for estimation of serum ammonia levels. The major interference for the assay of serum ammonia estimation is from contamination by ammonia in air and water. Also temperature of air can change values. So it is strictly collected in cold temperature and cold chain is maintained. Sample of blood immediately analyzed to prevent error in estimation of ammonia value. Analytical and physiological

variables including drug –patients on neomycin(12), lactulose lowering ammonia excluded and other substances which influence ammonia concentrations have been considered. (young et al). All data recorded and analyzed for morality and mortality. All data recorded and analysed and compared with standard results.

Result:

Among 59 patients of diagnosed hepatic encephalopathy patients are graded according to west heaven criteria and serial serum ammonia levels. Ammoniais formed to be the predominant causative agent for hepatic encephalopathy. It is helpful for diagnosis and as a guide to treatment .Normal levels are below 35micromol/dl. Eleveted level above this are used as an indicator to institute therapy for hepatic encephalopathy.

We found strong co-relation between ammonia level and the severity of hepatic encephalophy. Ammonia measurement was performed using newer and more reliable enzymatic method and grading of encephalopathy was bonded to the ammonia measurements. Under these conditions ammonia levels co-related strongly with severity.

In this study 34% cases seen in grade 1, 16% In grade 2, 12% in grade 3 and 38% in grade 4. Lowest values such as 20micromol/dl is seen in grade 1 and all reading are below 126micromol/dlsuqqestingqood prognostic values. But in cases of grade 3 and grade 4 the serum ammonia values are maximum above 160 micromol/dl which indicates poor prognostic indicator such finding also confirmed by STAHL J.(20)

In this study we also found that serial levels of ammonia levels during the treatment of hepatic encephalopathy shown decrease in levels of ammonia. Neverthless, there remains substantial overlap in ammonia levels by grades of hepatic encephalopathy which may be explained by variability in ammonia levels through the day, a possible lay between elevation in ammonia levels and hepatic encephalopathy in some patients, or the possibility that compounds other than ammonia are also involved in the pathogenesis of hepatic encephalopathy. Janus Pona and anjana Agrawal(2003)also found the similar observation in their study.(15)

Conclusion:-

Levels of serum ammonia level below 87 micromol/ lit is the prognostic indicator and high chances of improvement. Levels above 115 micromol / lit have irreversible prognosis and mostly found in comatose state . Serum ammonia levels are strongly co-relating with severity and grades of hepatic encephalopathy and a diagnostic indicator in case of hepatic enaphalopathy. Thus serum ammonia levels are used for prognosis of hepatic encephalopathy. It cannot be used as diagnostic criteria as many factors such as protein diet, use of medicines such as- acetazolamides, valproate, furosemide, strenuous exercise can affect levels.

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