

## LEVELS OF SERUM MAGNESIUM IN NORMAL PERSONS AND PERSONS SUFFERING FROM VIRAL HEPATITIS AND DIABETES MELLITUS - A COMPARATIVE STUDY

Raisa Faheem<sup>1</sup>, Anjum Sultana Khatoon<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Biochemistry, Owaisi Hospital and Research Centre, Hyderabad.

<sup>2</sup>Assistant Professor, Department of General Medicine, Owaisi Hospital and Research Centre, Hyderabad.

### ABSTRACT

#### BACKGROUND

The Magnesium is the fourth most abundant cation in the body, second most abundant cation of the intracellular fluid and is known to be intimately associated with a variety of metabolic events. Magnesium is one of the most vital elements in biologic systems. In the plant world, it is the key element of chlorophyll. In the animal world, it is essential for many vital enzyme systems among which is the activation of membrane bound adenosine triphosphates. This enzyme system deals with energy production through oxidative phosphorylation and with distribution of sodium and potassium across the cell membrane.

#### MATERIALS AND METHODS

The patients admitted in Owaisi Hospitals & Research Centre, Hyderabad were clinically investigated and pathological proved have been selected for the present study of serum magnesium estimation. In the present case 22 cases of viral hepatitis and 40 cases of normal (control) were considered and (40 normal individuals, 30 males and 10 females were studied to serve as controls and 15 cases of diabetes mellitus are studied in the present case.

#### RESULTS

The present study presents the data on level of serum Magnesium in normal and diseased persons (Viral Hepatitis). The results reveal that the mean serum magnesium levels are found to be higher in Viral Hepatitis and in diabetes mellitus in Comparison with that of Control (Normal) Group.

#### CONCLUSION

This study has shown that the mean Serum Magnesium Level were higher in cases of Viral Hepatitis and in diabetes mellitus in comparison with the normal control group.

#### KEYWORDS

Serum Magnesium, Viral Hepatitis, Diabetes Mellitus.

**HOW TO CITE THIS ARTICLE:** Faheem R, Khatoon AS. Levels of serum magnesium in normal persons and persons suffering from viral hepatitis and diabetes mellitus - a comparative study. J. Evid. Based Med. Healthc. 2017; 4(57), 3456-3458. DOI: 10.18410/jebmh/2017/688

#### BACKGROUND

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia. Several distinct types of DM are caused by a complex interaction of genetics and environmental factors. Depending on the aetiology of the DM, factors contributing to hyperglycaemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production. The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on the health care system. Type 2 diabetes mellitus is on track to become one of the major

global public health challenges of the 21<sup>st</sup> century. Diabetes is fast gaining the status of a potential epidemic in India, with more than 62 million diabetic individuals currently diagnosed with the disease and it is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India.

Magnesium ions are bound to proteins and a variety of biologic compounds. Hence the total content of magnesium in the body fluids need not bear any simple relationship to the concentration of free magnesium ions present. In plasma, the liver is one of the most important Organs in energy metabolism. Most plasma Apo lipoproteins, endogenous lipids and lipoproteins, are synthesized in liver. This depends on the integrity of liver cellular function, which ensures homeostasis of lipid and lipoprotein metabolism. Similarities and dissimilarities in patients with hepatitis B and hepatitis C, Clinically and metabolically has been investigated.<sup>1</sup> The information accumulated by this study will help to provide a better understanding of involve metabolic processes. Hepatitis B Virus (HBV) infection, a major world health problem, is hyper endemic in South Asia and. Being a major cause of Morbidity and Mortality, prophylaxis using

*Financial or Other, Competing Interest: None.*

*Submission 01-07-2017, Peer Review 08-07-2017,*

*Acceptance 14-07-2017, Published 15-07-2017.*

*Corresponding Author:*

*Dr. Anjum Sultana Khatoon,*

*No. 16-8-319, Chanchalguda,*

*Hyderabad, Telangana- 500024.*

*E-mail: dranjumsultanakhatoon@gmail.com*

*DOI: 10.18410/jebmh/2017/688*



the highly efficacious hepatitis B Vaccine is recommended for those at risk.<sup>2</sup> The hepatitis C Virus (HCV) is a linear, single-stranded RNA Virus of the Flaviviridae family that was identified in 1989 and is recognized as the major causal agent of non-A, non-B Hepatitis.<sup>3</sup> HCV is one of the leading causes of chronic liver disease worldwide, affecting 3% of the World's population, Diagnoses and treatment of HCV-related autoimmune features has become a clinical challenge in HCV-infected patients in whom chronic liver disease associated with severe auto immune features may contribute to a very poor Prognosis.<sup>4,5</sup> Alterations in Serum trace elements including Zinc(Zn), Copper (Cu), Iron (Fe) and magnesium (Mg) in patients with Chronic Hepatitis 'c' has been determined.<sup>6</sup> The results are compared with those of age and Sex with healthy individually. A study has been conducted to determine and compare & serum trace metal levels in viral hepatitis-associated with chronic liver disease.<sup>7</sup> The Results suggest that the changes in liver cell pathology compounded by functional impairment may alter the metabolism of trace metals, in particular, Zinc and Copper. The relationship between chronic hepatitis and trace elements has not been understood clearly.<sup>8</sup> various trace elements are responsible for many bio chemical, immunological and physiological activities Metabolic balance studies have suggested that an intake of 8.3– 12.5 amol daily equivalent to 0.15– 0.17 amol/kg is required to maintain magnesium balance. However, the gut may well adopt to low magnesium intake by increasing proportionate absorption, as suggested by.<sup>9</sup>

Gastrointestinal motility disorders are common in patients with diabetes mellitus. It has been estimated that more than 75% of diabetics may have gastrointestinal symptoms directly related to the effects of diabetic neuropathy. 54 Patients may present with a spectrum of manifestations from severe gastrointestinal symptoms to mild, subclinical disease. Motility disturbances are common in diabetics; however, they often do not correlate well with the presence or severity of symptoms. It has been long appreciated that even asymptomatic diabetics may have abnormalities in gastrointestinal function. Symptoms of dysphagia and postprandial fullness may be underreported by diabetic patients and physicians because they appear minor compared with those of nephropathy, retinopathy, and cardiovascular disease.

Many diabetics may have transient alterations in gastrointestinal function during periods of metabolic derangement or during acute diabetic ketoacidosis. Dilation of the stomach may occur acutely during diabetic ketoacidosis and resolve completely with placement of a nasogastric tube and correction of acidosis. Hypomagnesaemia may be seen in renal failure and suppress intestinal motility. A complete evaluation and metabolic profile are important to uncover potentially reversible complications that may have been originally attributed to diabetes of the gut. Gastrointestinal complications should not be ascribed to diabetes until other gastrointestinal diseases are excluded.

The abnormalities that are present may be due to a combination of underlying motor disease secondary to neuropathy or to metabolic derangements secondary to elevated blood glucose. In general, clinical symptoms from diabetic autonomic dysfunction are seen more commonly in diabetics who are insulin dependent, have poor glucose control, are older, and have evidence of peripheral neuropathy.

The pathogenesis of diabetic motility dysfunction remains unknown. -Altered motility in diabetics appears to be a result of altered sympathetic function and cholinergic denervation. Although there is damage to the vagus nerve resulting in vagal nerve dysfunction, damage appears to be more prevalent in the postganglionic sympathetic nerves, sympathetic ganglia, and intramural adrenergic plexuses. 6, 29, 58 Sympathetic nerve damage may be particularly important in the pathogenesis of anal sphincter dysfunction. Other studies have shown that there are deficiencies of neurotransmitters such as met-enkephalin, serotonin, calcitonin gene-related peptide, substance P, and peptide Y in diabetic rats. 15, 33, 36 In contrast, levels of vasoactive intestinal peptide have been shown to be increased in the myenteric plexus of diabetics.

### Aims and Objectives

All diabetics should be carefully screened for certain drugs that may lead to side effects. Aluminium-containing and magnesium-containing antacids are used commonly by diabetics and may cause diarrhoea, whereas calcium carbonate-containing antacids are frequently associated with constipation. Patients with impaired renal function are sometimes unable to excrete aluminium and magnesium and may develop hypermagnesaemia or aluminium toxicity from chronic antacid ingestion.

### MATERIALS AND METHODS

The Study was conducted for a period of two years comparing the Serum Magnesium levels in Viral Hepatitis and diabetes mellitus in comparison with normal group. The patients admitted in Owaisi Hospitals & Research Centre, Hyderabad were clinically investigated and pathological proved have been selected for the present study of serum magnesium estimation. In the present case 22 cases of Viral hepatitis and 40 cases of normal (control) were considered, Routine tests were conducted for estimation of magnesium and for diagnosis of Viral Hepatitis and diabetes mellitus. In the case of diabetes mellitus 40 normal individuals, 30 males and 10 females were studied to serve as controls and 15 cases of diabetes mellitus are studied in the present case.

### Inclusion Criteria

Type 2 Diabetes mellitus patients and patients with viral hepatitis with raised conjugated bilirubin levels.

### Exclusion Criteria

1. Type 1 Diabetes Mellitus.
2. Alcohol abuse.
3. UTI/Pyelonephritis.

4. Patients on magnesium based antacid medication.
5. Patients on long term diuretics.
6. Patients with Malabsorption or chronic diarrhoea.
7. Bed ridden patients.
8. Patients on dialysis.

**RESULTS**

It is evident from Table 1 that serum magnesium level in case of Persons suffering from Viral Hepatitis is high in comparison with that of control (Normal) Group.

In 22 subjects of Viral Hepatitis the mean magnesium value is found to be 3.17 mEq /L than the control group (Normal Group).The mean value is found to be 1.96 mEq /L.

The Table 1 Shows Serum magnesium levels in Control group (Normal persons) and in Persons suffering from Viral Hepatitis. Their ranges and standard deviations are given below.

Group	Serum Magnesium Levels (mEq/L)
<b>1. Control Group</b>	
Range	1.59 - 2.33
Mean	1.96
S. D. +	0.1891
<b>2. Viral Hepatitis</b>	
Range	2.35 - 4.35
Mean	3.17
S. D. +	0.5127

**Table 1. Shows Serum magnesium levels in Control group (Normal Persons) and in Persons suffering from Viral Hepatitis**

In 15 subjects of diabetes mellitus the mean magnesium value is found to be 3.35 mEq/L than the control (Normal), mean value of 1.96 mEq/L.

Group	Serum Magnesium in mEq/L
Control group (normal range)	1.59 – 2.33
Mean	1.96
S.D.I.	0.1891
Diabetes Mellitus	
Range	2.35 – 4.35
Mean	3.35
S.D.I.	0.51 /2

**Table 2. Reveals that Serum magnesium Level in case of persons suffering from diabetes Mellitus in High in Comparison with that of Control (Normal) Group**

**DISCUSSION**

The study suggests that the in case of viral Hepatitis, the value of Serum magnesium is higher than the control group, which may be due to different pathological and malfunctioning of different systems. This might be possibly due to the fact that the destruction of hepatic cells causes release of magnesium and loss of absorption of magnesium in the liver cells. Whereas in case of diabetes mellitus, the value of serum magnesium is higher than the control group, which may due to different pathological, renal and malfunctioning of different systems.

**CONCLUSION**

From the present studies we have come to the conclusion that raised magnesium level in diabetes was due to decrees gastric motility as a result of diabetic neuropathy.

Acute hepatocellular disease is associated with a raised serum magnesium levels. This raise parallels with serum bilirubin levels (P less than 0.001 statistically significant). With the onset of recovery from the acute process the levels gradually return to normal.

**REFERENCES**

- [1] Mastoi AA, Devrajani BR, Shah SZA, et al. Metabolic investigations in patients with hepatitis B and C. World J Gastroenterol 2010;16(5):603-607.
- [2] Pungpapong S, Kim WR, Poteruncha JJ. Natural history of hepatitis B virus infection: an update for clinicians Mayo Clin Proc 2007;82(8):967-975.
- [3] Choo QL, Kuo G, Weiner AJ, et al. Isolation of a cDNA clone derived from a blood-borne non-A, non-B viral hepatitis genome. Science 1989;244(4902):359-362.
- [4] Bethlen S, Chandrikakumari K, de Leval L, et al. Chronic hepatitis C infection in a patient with bone marrow hypoplasia. World J Gastroenterol 2008;14(26):4238-4240.
- [5] Trejo O, Ramos-Casala M, Garcia-Carrasco M, et al. Cryoglobulinemia: study of etiologic factors and clinical and immunologic features in 443 patients from a single center. Medicine (Baltimore). 2001;80(4):252-262.
- [6] Ali NM, Kader SI, Aldabagh MA. Serum levels of Copper, Zinc, Iron and Magnesium in Iraqu’s patient with chronic Hepatitis C. Karbala J Med 2011;4(3-4):1146-1150.
- [7] Pramoolsisap C, Promvanit N, Kominder S, et al. Serum trace metals in chronic viral hepatitis and hepatocellular carcinome in Thailand. Journal of Gastroenterology 1994;29(5):610-615.
- [8] Meram I, Sirmatel F, Ahi S, et al. Plasma copper and zinc levels in chronic viral hepatitis. Saudi Med J 2004;25(8):1066-1069.
- [9] Williams RJ, Wacker EC. Cation balance in biological systems. JAMA 1967;201(1):96-100.