



Surgery

ROLE OF SERUM MAGNESIUM IN DIABETIC FOOT ULCERS IN A TERTIARY HOSPITAL IN SILCHAR, ASSAM

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ABSTRACT Diabetic foot ulcer is the most common complication of Diabetic patients presenting to the General Surgery OPD. Magnesium ion is known to be a cofactor in many of the enzymatic processes occurring in the body and has also been implicated in lowering the insulin resistance or in other word, increasing the insulin sensitivity. **Aims And Objectives:** To know the level of magnesium ion in diabetic foot patients presenting to General Surgery Department of Silchar Medical College and Hospital. **Materials And Methods:** An Observational study was conducted in the Department of General Surgery for a period of 3 months i.e 1st August, 2023 to 31st October, 2023. **Result:** This study was an observational study conducted at SMCH, to know the role of serum magnesium in diabetic foot ulcer patients. There were a total of 70 cases in the diabetic foot ulcer cases in the last 3 months. Gender wise distribution was also studied.

KEYWORDS :

INTRODUCTION

Diabetic foot ulcer is the most common complication of Diabetic patients presenting to the General Surgery OPD. Magnesium ion is known to be a cofactor in many of the enzymatic processes occurring in the body and has also been implicated in lowering the insulin resistance or in other word, increasing the insulin sensitivity. Thus, a need arose for evaluating its role in diabetic patients and knowing the extent of the magnesium levels in the body of diabetic patients. Low levels of serum magnesium in diabetic patients can cause arrest of the many enzymatic processes occurring in the body causing the disease to have serious implications in the form of diabetic foot ulcers. India being a developing country with the ever increasing burden of diabetes, a study was undertaken to find the correlation between the extent of serum magnesium levels in patients presenting with diabetic foot ulcers.

AIMS AND OBJECTIVES

To know the level of magnesium ion in diabetic foot patients presenting to General Surgery Department of Silchar Medical College and Hospital.

MATERIALS AND METHODS

An Observational study was conducted in the Department of General Surgery for a period of 3 months i.e 1st August, 2023 to 31st October, 2023.

70 known cases of Diabetes mellitus with foot ulcers were taken in the study and serum magnesium of all these patients were then analysed.

Patients of diabetic foot ulcers with other comorbidities like chronic kidney disease, were excluded from the study.

RESULT

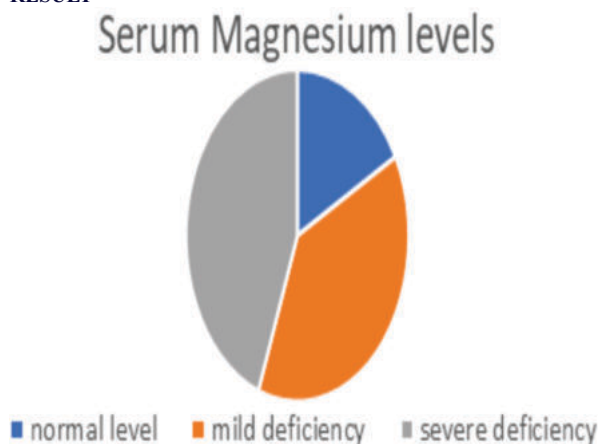


Fig. 1: Serum Magnesium levels in patients with Diabetic Foot

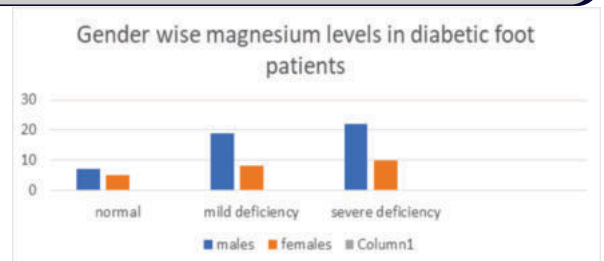


Fig. 2: Gender wise distribution

DISCUSSION

Magnesium is the fourth most abundant element in the human body ($\text{Ca}^{2+} > \text{K}^{+} > \text{Na}^{+} > \text{Mg}^{2+}$) and the second most abundant cation within the body's cells after potassium. A serum magnesium level less than 1.7–1.8 mg/dL (0.75 mmol/L) is a condition defined as hypomagnesemia. As stated above, magnesium is a cofactor for over 600 enzymes and an activator for an additional 200 enzymes. Given the ability of Mg^{2+} to bind inorganic phosphate, ATP, phosphocreatine, and other phosphometabolites make complex with magnesium, with important consequences for many metabolic reactions, especially those related to carbohydrate metabolism and cellular bioenergetics.

The paramount importance of magnesium in the glycolytic pathway and mitochondrial synthesis of ATP has been known for a long time. Many of the glycolytic enzymes are sensitive to magnesium, whose principal function is to facilitate the transfer of high energy phosphate. Thus, hexokinase, phosphofructokinase, phosphoglycerate kinase, and pyruvate kinase work in this manner, while aldolase and enolase require Mg^{2+} for their stability and activity.

Magnesium deficiency has been correlated to type 2 diabetes mellitus, metabolic syndrome, and insulin resistance. As well as all other protein kinases, the tyrosine kinase activity of the β -subunit of the insulin receptor is dependent on magnesium concentration, therefore a magnesium deficiency may result in an impaired insulin signal. In other words, the lower the basal magnesium, the greater the amount of insulin required to metabolize the same glucose load, indicating decreased insulin sensitivity. A recent study demonstrates that magnesium improves glucose consumption and glucose tolerance through two main mechanisms: stimulation of the GLUT4 gene expression and translocation of this glucose transporter to the plasma membrane, and suppression of the glucagon effect and gluconeogenesis pathway in the liver and muscle.

In the study undertaken, out of the 70 patients that were studied only 11 were found to have normal magnesium levels. The male population was more affected than the female population and the number of males having severe magnesium deficiency were considerably higher. A clear gender disparity was seen in the occurrence of diabetic foot as most of the people affected were males.

CONCLUSION

This study was an observational study conducted at SMCH, to know the role of serum magnesium in diabetic foot ulcer patients. There were a total of 70 cases in the diabetic foot ulcer cases in the last 3 months, out of which only 12 cases had a normal serum magnesium levels. It was found that male population was more involved, with only 7 out of the 48 male patients that were studied had normal levels of serum magnesium.

Therefore, from this study we can conclude to have a correlation between serum magnesium levels and diabetic foot ulcers. However, the role of magnesium supplementation and its impact on improving the glycemic control is yet to be known.

The impact of social class on magnesium deficiency has also been demonstrated as 90% of the patients studied belonged to lower socioeconomic strata of society. Thus, magnesium deficiency should be screened for in patients with diabetes mellitus and even in routine screening as it affects multiple metabolic processes in the body and its deficiency has multiple manifestations which are often overlooked.

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