

A Study of association of serum magnesium and zinc levels in diabetics

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Abstract

Background: Hypomagnesaemia and hypermagnesuria was reported to be associated with diabetes complications. Thus, magnesium has drawn considerable attention for its potential role in improving insulin sensitivity and preventing DM. Zinc, another important trace element, acting as a cofactor for several biochemical processes has a major role in health status. There is substantiating evidence indicating the importance of zinc in DM. Impaired zinc metabolism, decreased plasma zinc and hyperzincuria has been reported as a consequential effect of glucose absorption. But limited studies have been conducted in this part of the world. This study puts in an effort to find the answers.

Aims and Objectives: To study the association of serum magnesium and zinc levels in diabetics.

Materials and Methods: This study was done in the Department of General Medicine, SSPM'S Medical College and Lifetime Hospital, Padve.

This study was done from Jan 2019 to Dec 2020.

Ninety and an equal age and sex matched control were used for the study.

Results: There is a strong association between the serum magnesium and zinc levels in diabetics when compared to normal individuals.

Conclusion: More number of studies have to come up in different geographical locations so as to be helpful to the practicing physicians.

Keywords: Magnesium, zinc, serum, association, diabetics

Introduction

One of the most complicated complex metabolic disease causing death of 1 in 20 individuals is diabetes mellitus ^[1]. The prevalence of DM is predicted to globally hit 366 million in 2030 with a maximum increase in developing countries like India ^[2]. Type 2 DM (T2DM), most commonly prevalent ~90-95% is usually associated with predominant insulin resistance, relative insulin deficiency, and a poor insulin secretion ^[3]. In past decades, it has become apparent that deficiencies of trace elements are commonly associated with T2DM ^[4-6]. Magnesium, a divalent cation is one among the common micro mineral deficiency established in DM ^[7, 8]. Decreased serum magnesium levels and increased urinary magnesium losses have been recognized in both type 1 and type 2 DM. Decreased dietary magnesium intake has been

associated with increased incidence of T2DM [9]. Hypomagnesaemia and hypermagnesuria was reported to be associated with diabetes complications [7, 10, 11]. Thus, magnesium has drawn considerable attention for its potential role in improving insulin sensitivity and preventing DM. Zinc, another important trace element, acting as a cofactor for several biochemical processes has a major role in health status [12]. There is substantiating evidence indicating the importance of zinc in DM. Impaired zinc metabolism, decreased plasma zinc and hyperzincuria has been reported as a consequential effect of glucose absorption [13, 14]. But limited studies have been conducted in this part of the world. This study puts in an effort to find the answers.

Aims and Objectives

To study the association of serum magnesium and zinc levels in pre-diabetics when compared to the normal individuals.

Materials and Methods

This study was done in the Department of General Medicine at SSPM'S Medical College and Lifetime Hospital, Padve.

This study was done from Jan 2019 to Dec 2020.

Ninety and an equal age and sex matched control were used for the study.

Inclusion criteria

- Known diabetics

Exclusion criteria

- Pre-diabetics

Blood was collected under aseptic precautions and was sent to the Department of Biochemistry for estimation of the serum zinc and magnesium levels. Their levels were estimated and were compared in the two groups.

Statistical analysis

All the statistical analysis was done using the latest R software.

Results

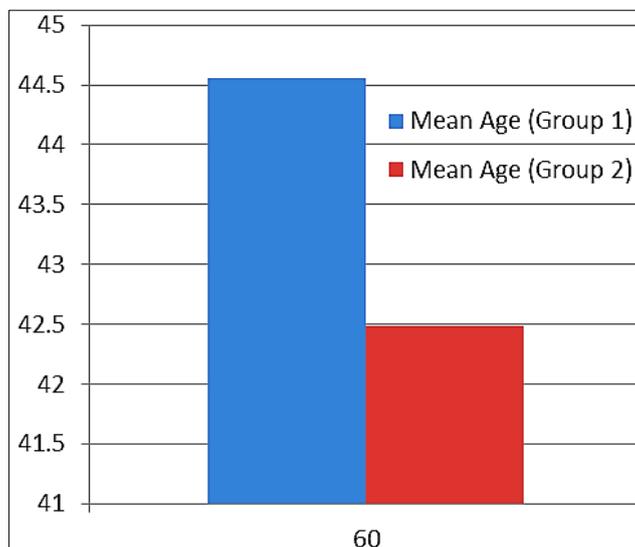


Fig 1: Age

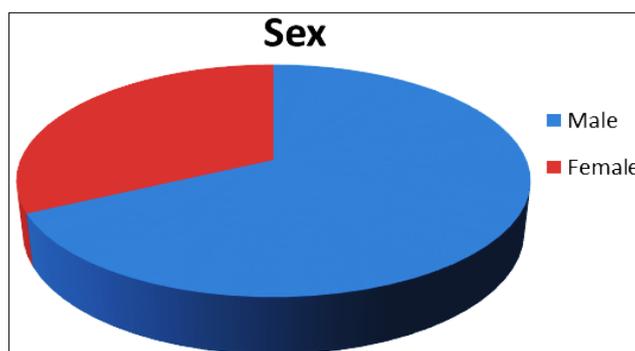


Fig 2: Sex Distribution

Table 1: Serum Magnesium level

Group 1 (diabetics)	Group 2 (Control)	p-value
1.39 ± 0.61	2.38 ± 0.51	<0.001

Table 2: Serum Zinc Level

Group 1 (diabetics)	Group 2 (Control)	p-value
56.17 ± 6.94	89.83 ± 5.93	<0.001

Discussion

Zinc and magnesium are important trace elements that play vital roles in several biochemical functions. ^[15, 16] In diabetes, these minerals attract importance due to its association with insulin sensitivity, insulin secretion and blood glucose regulation. ^[17] Diabetics had lower serum magnesium in our study than controls which is in association with Arpaci *et al.* study where hypomagnesemia was closely associated with poor glycemic status along with microalbuminuria and other complications ^[11]. Sharma *et al.* showed hypomagnesemia could be an early predictor for poor glycemic status and its associated complications ^[18]. Hypomagnesemia due to increased urinary loss of magnesium ^[19] is caused by reduced tubular reabsorption of magnesium ^[20]. With respect to serum magnesium levels, Kundu *et al.*

showed a significant association of hypomagnesemia with diabetic retinopathy patients which suggests hypomagnesemia could be a probable risk factor in the development and progression of diabetic complications [21]. SP *et al.* study also observed a significant decrease in mean serum zinc and magnesium concentration in all diabetics than controls. Few studies showed the association of glycemic status with zinc levels as our study. Dasarathan *et al.* showed a significant inverse relationship ($r = -0.54$) of zinc concentration with HbA1c which is parallel to our study ($r = -0.56$) [22]. McNair *et al.* and Farooq *et al.* reported that serum zinc levels were inversely related to glycemic status [23, 24]. According a study conducted by Hypomagnesemia serum levels was significantly associated with development of pre-diabetes and impaired glucose tolerance conditions. Surprisingly no impaired fasting glucose serum levels were detected. This indicates magnesium levels helps to prevent the progression of the disease. It's a known fact that it's associated with diabetes but is associated with prediabetics is the question. This study successfully links the relation.

Conclusion

This study successfully links the relation between the serum zinc and magnesium levels in the pre-diabetics.

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