



A STUDY OF ASSOCIATION OF SERUM MAGNESIUM AND ZINC LEVELS IN PRE-DIABETICS

General Medicine

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ABSTRACT

Background: We all know that the beta cells is constantly under attack by the free radicals and the anti-oxidant property of the magnesium and the zinc perhaps saves the day for the susceptible beta cells. Not many results turned up when reports regarding the direct involvement of the trace elements in glucose metabolism was searched for. There are reports suggesting the association of trace elements with the progression of the disease. Some have suggested that there is a direct association with incidence of the disease. There are some other studies that have reported that putting the patients on vitamins, minerals and anti-oxidants did not show any improvement in the disease status. This study puts in a sincere effort to find the association of serum magnesium and zinc in pre-diabetics.

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

Materials and Methods: This study was done in the Department of Dhanalakshmi Srinivasan Medical College, Tamilnadu.

This study was done from July 2020 To July 2021.

Sixty subjects 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, pre-diabetics.

INTRODUCTION:

Diabetes Mellitus is a metabolic disorder. All that comes to mind when the name diabetes strikes is the sugar. But there are so many other derangements that happen in diabetes that has to be considered. There are actually derangements that occur not only in carbohydrate metabolism but also the closely connected protein and lipid metabolism. Then there are nucleotide, heme, vitamins and mineral metabolism. Even though there are studies popping up every now and then there is a definite gap of knowledge in the understanding of the trace elements and the subtle changes that occur due to lack of these.^{1,2} Trace elements like magnesium and zinc have lot of anti-oxidant property and this would be rather their primary function. But apart from these there are so many other complicated cascaded function of these that it will take a while until it is completely understood. We all know that the beta cells is constantly under attack by the free radicals and the anti-oxidant property of the magnesium and the zinc perhaps saves the day for the susceptible beta cells.^{3,4} Not many results turned up when reports regarding the direct involvement of the trace elements in glucose metabolism was searched for.^{5,6} There are reports suggesting the association of trace elements with the progression of the disease.⁷ Some have suggested that there is a direct association with incidence of the disease.⁸ There are some other studies that have reported that putting the patients on vitamins, minerals and anti-oxidants did not show any improvement in the disease status.⁹ This study puts in a sincere effort to find the association of serum magnesium and zinc in pre-diabetics.

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 Dhanalakshmi Srinivasan Medical College, Tamilnadu.

This study was done from July 2020 To July 2021.

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

INCLUSION CRITERIA:

- Random blood sugar level of 140mg/dl to 199mg/dl were included in the study as pre-diabetics
- Age and sex matched

EXCLUSION CRITERIA:

- None of the patients were on treatment and were known diabetics
- Subjects who were known type 1

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:

Table 1: Age

Total	Mean Age (Group 1)	Mean Age (Group 2)	p-value
60	42.12 ± 3.67	41.72 ± 2.11	>0.001 (Not sig)

Table 2: Sex Distribution

	Total	Male	Female
Group 1 (pre-diabetics)	60	49	11
Group 2 (Control)	60	49	11

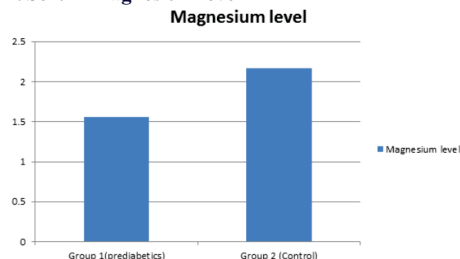
Table 3: Serum Magnesium level

Group 1 (pre-diabetics)	Group 2 (Control)	p-value
1.56 ± 0.24	2.17 ± 0.28	<0.001

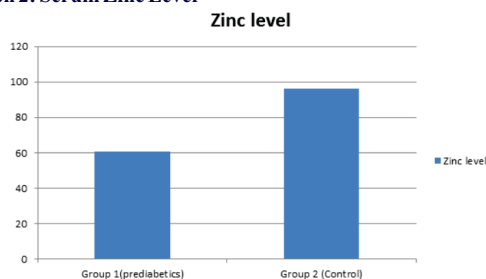
Table 4: Serum Zinc Level

Group 1 (pre-diabetics)	Group 2 (Control)	p-value
60.81 ± 5.71	96.18 ± 8.82	<0.001

Graph 1: Serum Magnesium level



Graph 2: Serum Zinc Level



DISCUSSION:

A study conducted by Hruby A et al¹⁰ confirmed the association of deficiency of zinc and magnesium with hyperglycaemia, hyperinsulinemia and also high insulin resistance. In another study conducted by Vashum KP¹¹ concluded that zinc actually helped in glycaemic control. Zinc is known to function as anti-oxidant and it is known to reduce the damage and thus destruction of insulin receptors. Thus zinc is known to reduce insulin resistance.³ Some authors have claimed that it stabilizes the structure of insulin and also is helpful in the storage of insulin in the pancreas.^{11,12} Magnesium is also a known anti-oxidant but apart from this it also according to some studies is known to increase the affinity of insulin to its receptors.^{2,13} According to a study conducted by Hruby et al¹⁰ supplementation of magnesium reduced insulin resistance in patients who took it when compared to the subjects who did not take the supplementation. This study was conducted over a period of 7 years indicated towards the long term effectiveness of magnesium towards preventing the diabetes type 2. According to a co-hart and meta-analysis magnesium supplementation indicated lower risk of development of diabetes and thus decreasing its complications.^{14,15,16} According to a study conducted by Guerrero et al¹ hypo magnesium 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 pre-diabetics 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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