

The effect of low serum vitamin d in pre-diabetic individual

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Abstract

Diabetes and vitamin D are prevalent diseases. We need strong measures to control the episodes of their occurrence. Vitamin D deficiency and insulin resistance are entwined. On vitamin D deficiency rectification the expansion of diabetes in between the age 15 to 55 years was reduced. The contributors were explained their role in the study & their consent was taken. An inclusion and exclusion criterion was purely determined. No participant was on oral medication. The undersigned givers had vitamin D deficiency and hence were supplemented. Some used oral and some used injectable form too. The yield was certainly extraordinary. The research study acclaimed the brilliant outcomes. The rectified levels of vitamin D showed reduced levels of fasting & Post prandial blood glucose and HbA1C post intervention in both the genders. Hereafter, the study verified that vitamin D has the effective position in managing blood glucose & insulin sensitivity in pre-diabetes (p<0.001).

Keywords: Pre-diabetes, Vitamin D, Vitamin D deficiency, Diabetes, Serum calcium levels.

Introduction

Indians possesses Vitamin D deficiency. Pre-diabetes is interconnected with the early sign of insulin struggle, β -cell malfunctioning and the abnormalities of glucose variations. Various observational experiments corroborate the bond of pre-diabetes with early signs of nephropathy, neuropathy, amplified danger of CVD, CKD and diabetic retinopathy. Various influential risks elevate the guesstimate of diabetes. For pre-diabetics, lifestyle alteration is one of the basic nitty-gritties for diabetes reserve with 40%–70% risk decline.

Review

Deep Dutta research study was conducted in India, in 2012 presented the involvement of vitamin D deficiency and insulin resistance in pre-diabetes. Dutta, detailed that the prospective analysis is obligatory in the favor of results.¹ In 2012; researchers witnessed innumerable studies to detect how vitamin D deficient societies developed Type II Diabetes mellitus. The end of the review was reasonably stimulating. It showed the normal levels of vitamin D had 19% minimized prospects of developing Type II Diabetes.²

Paul Lips, MD, PhD at VU University Medical Center in Amsterdam conducted a study on Low vitamin D is accompanying with insulin resistance, metabolic syndrome, and diabetes mellitus.³

Methodology

The study is done with the aim to find the importance of vitamin D in uplifting the living standards and decreasing the risk of lifestyle disease named as Diabetes mellitus or not. The research is performed in one body. All were screened deeply. Written consent was obligatory. Everything was well documented. The blood samples were accumulated for screening on the first day of their enrolment and once after 10 weeks of vitamin D supplementation. They were screened for BS (F), (PP), HbA1c, 25(OH)D, Serum Calcium. After first tests the dose of 60K IU of vitamin D₃ was advised once a week for 10 weeks and 1000mg calcium a day for 10 weeks. Vitamin D test was prepared by sandwich ELISA method. Serum Calcium was prepared by ARSENAZO III. HbA1c was prepared by HPLC method and both the blood glucose levels (fasting and post prandial) were prepared by using Hexokinase.

Results

The research study displayed the astonishing drop in fasting and post prandial blood glucose and glycated hemoglobin post-intervention in both the genders. This research study validated that vitamin D supplementation is expedient part in regulating the insulin resistance, correcting insulin sensitivity and blood glucose levels in pre-diabetes (p<0.001). There was no remarkable difference in the parameters based on the gender post intervention (p>0.05) (Table 1).

Table 1: Blood parameters pre and post intervention in pre-diabetics when classified according to gender

	Males (n=78)			Females (n=74)		
	Pre-intervention	Post-intervention	P value	Pre-intervention	Post-intervention	P value
Fasting blood sugar (mg/dl)	110.9±8.5	90.4±7.5	0.001	114.4±9.5	90.0±6.7	0.001
Post prandial blood sugar (mg/dl)	153.7±23.2	118.7±11.0	0.001	158.5±23.2	120.8±13.1	0.001
HbA1c (%)	6.1±0.2	5.1±0.2	0.001	6.2±0.2	5.1±0.2	0.001
Serum 25-hydroxy vitamin D (ng/ml)	11.8±9.2	40.9±9.0	0.001	13.2±9.9	38.7±6.4	0.001
Serum total calcium (mg/ml)	8.5±0.4	9.1±0.3	0.001	8.7±0.6	9.2±0.4	0.001

Data presented as Mean±SD

Table 2, shows a noteworthy decline in blood sugar fasting, post prandial, and HbA1c post-intervention in BMI categories (all three categories) demonstrating that vitamin D has a unique and vital role in controlling insulin sensitivity and blood sugar parameters ($p < 0.001$). A substantial rise in vitamin D and serum calcium parameters was spotted post intervention in all 3 BMI categories ($p < 0.001$) (Table 3).

Table 2: Change in blood parameters in pre-diabetics when classified according to Nutritional Status (BMI Categories)

	Normal weight (n=28)			Overweight (n=27)			Obese (n=97)		
	Pre-intervention	Post-intervention	P value	Pre-intervention	Post-intervention	P value	Pre-intervention	Post-intervention	P value
Fasting blood sugar (mg/dl)	114.1 ±10.3	88.9 ±7.3	0.001	110.7 ±9.7	90.1 ±7.4	0.001	112.8 ±8.6	90.6 ±7.0	0.001
Post prandial blood sugar (mg/dl)	147.2 ±26.3	120.9 ±10.8	0.001	151.2 ±18.3	118.4 ±13.1	0.001	159.9 ±22.8*	119.8 ±12.3	0.001
HbA1c (%)	6.2 ±0.2	5.2 ±0.2	0.001	6.1 ±0.2	5.0 ±0.2	0.001	6.1 ±0.2	5.1 ±0.2	0.001
Serum 25-hydroxy vitamin D (ng/ml)	12.2 ±8.9	38.2 ±7.7	0.001	13.4 ±10.1	41.2 ±6.5	0.001	12.3 ±9.7	40.0 ±8.2	0.001
Serum total calcium(mg/ml)	8.7 ±0.7	9.1 ±0.3	0.001	8.6 ±0.5	9.1 ±0.3	0.001	8.6 ±0.5	9.1 ±0.3	0.001

Data presented as Mean ± Sd. * $p < 0.05$ for comparison between normal weight and obese pre-diabetes

Conclusion

The research study has shown the positive results, making the study a success. It established that vitamin D excites pancreas to produce insulin that not only extends the duration of onset of type II DM but also helps in degenerating the reduced glucose tolerance levels or compromised fasting glucose levels to standard levels. The study showed the significant increase in vitamin D and serum calcium levels was observed post intervention in both males and females. The output of supplementation was really notable. It showed U-turn of pre-diabetes state towards normal. The research has given the magnificent outcomes. The reverse of vitamin D deficiency of serum calcium levels contributed in reduced levels of fasting blood sugar, post prandial blood sugar and HbA1C post intervention in both males and females. Hence, it is proven that vitamin D has a valuable role in managing blood sugar parameters and insulin sensitivity in pre-diabetes ($p < 0.001$).

Source of Funding

None.

Conflict of Interest

None.

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