

## Status of Vitamin-D in diabetic patients

Mohammad Ali Bayani (MD) <sup>\*1</sup>  
Rogheyyeh Akbari (MD) <sup>2</sup>  
Bahar Banasaz (MD) <sup>3</sup>  
Fayyaz Saeedi <sup>4</sup>

1- Department of Endocrinology,  
Babol University of Medical  
Sciences, Babol, Iran.

2- Department of Nephrology,  
Babol University of Medical  
Sciences, Babol, Iran.

3- Babol University of Medical  
Sciences, Babol, Iran.

4- Infectious Diseases and Tropical  
Medicine Research Center, Babol  
University of Medical Sciences,  
Babol, Iran.

**\* Correspondence:**

Mohammad Ali Bayani,  
Department of Endocrinology,  
Babol University of Medical  
Sciences, Babol, Iran

E-mail: bayanima49@yahoo.com

Tel: 0098 111 2238301-5

Fax: 0098 111 2238284

Received: 13 July 2013

Revised: 23 Aug 2013

Accepted: 7 Sep 2013

### Abstract

**Background:** Vitamin D (vit D) deficiency has been found to have an inverse relationship with the occurrence of type-2 diabetes mellitus (DM). The aim of this study was to assess the vit D level in type-2 diabetic patients.

**Methods:** One hundred-twenty DM patients selected as case group and 120 healthy individuals as control group were investigated in this study from October 2011 to September 2012 in Shahid Beheshti and Ayatollah Rouhani teaching hospital in Babol, North of Iran. Both groups were matched regarding age and gender. Serum levels of 25(OH)-vitamin D were measured in both groups. The data were collected and analyzed.

**Results:** The mean age of the case group was  $51.2 \pm 7.98$  and in control group was  $50.6 \pm 7.73$  years. The mean concentration of vit D in the case group was  $18.7 \pm 10.2$  and in the control group was  $24.6 \pm 13.5$  ng/dl ( $p=0.002$ ). The mean concentration of vit D in male subjects in both groups were equal but in women with diabetes was lower than the healthy women ( $19.3 \pm 11.9$  versus  $27.03 \pm 10.28$  ng/dl, respectively) ( $p=0.0001$ ). In diabetic patient vit D level was deficient in 77 (64.2%), insufficient in 30 (25%) and sufficient in 13 (10.3%) patients. In the healthy group, these parameters were seen in 44 (36.6%), in 46 (38.4%) and in 30 (25%) patients.

**Conclusion:** The results show that vit D concentration was significantly lower in diabetic patients than the healthy individuals. Although the mean concentration of vit D in males in both groups was equal but in the women with diabetes was lower than the healthy women.

**Keywords:** Diabetes Mellitus, Vitamin D, Deficiency, Male, Female

### Citation:

Bayani MA, Banasaz B, Saeedi F. Status of Vitamin-D in diabetic patients and compared it with healthy individuals. *Caspian J Intern Med* 2014; 5(1): 40-42.

*Caspian J Intern Med* 2014; 5(1): 40-42

With the increasing prevalence of DM all over the world, it is expected that this disorder will remain as one of the main causes of morbidity and mortality (1). In recent years, studies have shown that using vitamin D (vit D) can help decrease the incidence of diabetes and adjustment of insulin and glucose (2-5). Surveys demonstrated that consuming supplements of calcium with vit-D will significantly reduce FBS level (6). So, using supplements of vit-D alone can prevent the incidence of Type-1 diabetes (7). Recently, some studies have shown that the prevalence of vit D deficiency has increased and more than 50% of adult age suffer from this deficiency (8). The prevalence of vit D deficiency in the USA adult age was reported to be about 25% to 54% (9). In a multi-center study in Iran, Heshmat et al. reported that the prevalence of moderate to severe vit D deficiency was 47.2, 45.7 and 44.2% in age group of <50, 50-60 and >60 years old, respectively (10). DM is characterized by the combination of insulin resistance and impaired pancreatic  $\beta$ -cell function.

Some studies suggested that vit D could have a direct (via its role on the activation of pancreatic beta-cell and sensitive organs) or indirect (by regulation of calcium hemostasis) positive effect on insulin secretion and sensitivity (11-12). The aim of this study was to determine the level of vit D in diabetic patients and then compared with non-diabetic subjects.

## Methods

From October 2011 to September 2012, 120 diabetic patients who referred to the clinics of Rouhani and Shahid Beheshti teaching hospitals in Babol, Iran were selected as case group and 120 healthy subjects matched regarding sex and age (as control group) were evaluated. Inclusion criteria were patients whose diabetes was confirmed and were between 30-60 years old and agreed to participate in this study. Exclusion criteria were: use any drugs consisting of vitamin D, any disorder except diabetes such as osteomalacia, osteoporosis, inflammatory rheumatism and patients treated with corticosteroids, using drugs which interfere with vitamin D metabolisms such as carbamazepine, phenobarbital, sodium valporate, gabapentin, isoniazid, mineral oil and calcitonin. The control group was selected as the normal population subjects matched with the cases sex and age.

According to season changes in Vitamin D level, all samples were collected in one season. Vitamin D level was measured with quantitative ELISA using IDS kit, England. Vitamin D deficiency was defined as serum 25(OH) D concentration of less than 20ng/ml, insufficiency as 20ng/ml <25(OH) D <30 ng/ml and sufficiency was defined as 25(OH) D higher than 30 ng/ml (15). The data were collected and analyzed. To determine the differences in vitamin D levels, in both groups we used t-test. A p-value less than 0.05 was considered significant.

## Results

Fifty males and 70 females were enrolled in each group. The mean age of the case group was 51.2±7.98 and in control group was 50.6±7.73 years. The mean concentration of vit D in diabetic patients was 18.7±10.2 ng/dl and in the non-diabetic patients was 24.6±13.5 ng/dl (p=0.002). The mean concentration of vit D in diabetic male patients was 18.04±7.4 and in non-diabetic male patients was 21.23±16.6

ng/dl (p=0.219). The mean concentration of vit D in women with diabetes was 19.3±11.9 and in healthy women was 27.03±10.28 ng/dl (p=0.00) (table 1). Totally in diabetic patients, Vit-D level was deficient in 77 patients (64.2%), insufficient in 30 (25%) patients and sufficient in 13 (10.3%) patients sufficient.

In the healthy group, 44 (36.6%) patients had a deficiency of Vit-D, 46 (38.4%) patients with insufficiency of vit D and 30 (25%) patients had sufficiency of vit D.

**Table 1. Vit-D levels in the case and in the control group**

	Diabetic patients	Healthy person	Pvalue
Men	18.04±7.4	21.23±16.6	0.219
Female	19.3±11.9	27.03±10.28	p=0.00
Total	18.7±10.2	24.6±13.5	0.002

## Discussion

The results of this study showed that there was a statistical difference between vit D concentration in diabetic patients and the healthy subjects. Insufficiency of vit D in two groups also had higher prevalence. Need et al. showed that the patients who had higher levels of vit D concentration had lower FBS in comparison with the other groups. These results were similar to our findings (13). Lee et al. found that 89% of their study individuals suffered from deficiency of this vitamin and just 9 out of 300 persons had sufficient vit D concentration. They also found that the mean concentration of vit D in their patients was 26.11±13.6 this is higher than our findings in the diabetic patients (14).

This difference may be the result of different sunshine duration status in Korea and in Iran. Other study that was performed by Daga et al. in the North of India demonstrated that 91.1% of diabetic patients had vit D insufficiency. In their study vit-D concentration in diabetic patients was 7.88±1.2, however, in non-diabetic individuals, it was 16.64±7.83. Different diets in two groups were considered this difference. For example because of Caspian sea, seafood are used more in Mazandaran than India (15).

Gagnon et al. found that the mean serum concentration of vit D in diabetic patients was lower than the non-diabetic individuals (16). Taheri showed that mean serum concentration of vit D in diabetic patients was 20.6±11.4 and in non-diabetic individuals was 22.22±16.03 (17). These results were almost similar to the findings of our study. The weakness of this study is that we did this study only in one

season and because of sunshine duration difference in each season level of vitamin D may undulate during the year, so this study cannot predict the condition of hypovitaminosis in this area. In conclusion, our findings demonstrated that vit D concentration in diabetic patients was significantly lower in comparison to non-diabetic individuals. According to the high prevalence of vit D deficiency in this group, treating with vit D supplements maybe useful and seems to be necessary.

### Acknowledgments

We would like to thank the Vice-Chancellery for Research of Babol University of Medical Sciences for the financial support.

**Funding:** This paper is a resident thesis and has been financially supported by Babol University of Medical Sciences, Babol, Iran. (Grant number: 9032243)

**Conflict of interest:** No conflict of interest to declare.

### References

- Zella JB, DeLuca HF. Vitamin D and autoimmune diabetes. *J Cell Biochem* 2003; 88: 216-22.
- Zipitis CS, Akobeng AK. Vitamin D supplementation in early childhood and risk of type 1 diabetes: a systematic review and meta-analysis. *Arch Dis Child* 2008; 93: 512-7.
- Bourlon PM, Billaudel B, Faure-Dussert A. Influence of vitamin D3 deficiency and 1, 25 dihydroxyvitamin D3 on de novo insulin biosynthesis in the islets of the rat endocrine pancreas. *J Endocrinol* 1999; 160: 87-95.
- Baynes KC, Boucher BJ, Feskens EJ, Kromhout D. Vitamin D, glucose tolerance and insulinaemia in elderly men. *Diabetologia* 1997; 40: 344-7.
- Pittas AG, Harris SS, Stark PC, Dawson-Hughes B. The effects of calcium and vitamin D supplementation on blood glucose and markers of inflammation in nondiabetic adults. *Diabetes Care* 2007; 30: 980-6.
- Stene LC, Ulriksen J, Magnus P, Joner G. Use of cod liver oil during pregnancy associated with lower risk of Type I diabetes in the offspring *Diabetologia* 2000; 43: 1093-8.
- Tangpricha V, Pearce EN, Chen TC, Holick MF. Vitamin D insufficiency among free-living healthy young adults. *Am J Med* 2002; 112: 659-62.
- Looker AC, Dawson-Hughes B, Calvo MS, Gunter EW, Sahyoun NR. Serum 25-hydroxyvitamin D status of adolescents and adults in two seasonal subpopulations from NHANES III. *Bone* 2002; 30: 771-7.
- Hu FB, Meigs JB, Li TY, Rifai N, Manson JE. Inflammatory markers and risk of developing type 2 diabetes in women. *Diabetes* 2004; 53: 693-700.
- Heshmat R, Mohammad K, Majdzadeh SR, et al. Vitamin D Deficiency in Iran: A Multi-center Study among Different Urban Areas. *Iranian J Publ Health* 2008; 1: s72-8.
- Forouhi NG, Luan J, Cooper A, Boucher BJ, Wareham NJ. Baseline serum 25- hydroxy vitamin D is predictive of future glycemic status and insulin resistance: the Medical Research Council Ely Prospective Study 1990–2000. *Diabetes* 2008; 57: 2619-25.
- Chiu KC, Chu A, Go VL, Saad MF. Hypovitaminosis D is associated with insulin resistance and beta cell dysfunction. *Am J Clin Nutr* 2004; 79: 820-5.
- Need AG, O'Loughlin PD, Horowitz M, Nordin BE. Relationship between fasting serum glucose, age, body mass index and serum 25 hydroxyvitamin D in postmenopausal women. *Clin Endocrinol (Oxf)* 2005; 62: 738-41.
- Lee JI, Oh SJ, Ha WC, et al. Serum 25-hydroxyvitamin D concentration and arterial stiffness among type 2 diabetes. *Diabetes Res Clin Pract* 2012; 95: 42-7.
- Daga RA, Laway BA, Shah ZA, et al. High prevalence of vitamin D deficiency among newly diagnosed youth-onset diabetes mellitus in north India. *Arq Bras Endocrinol Metabol* 2012; 56: 423-8.
- Gagnon C, Lu ZX, Magliano DJ, et al. Serum 25-hydroxyvitamin D, calcium intake, and risk of type 2 diabetes after 5 years: results from a national, population-based prospective study (the Australian Diabetes, Obesity and Lifestyle study). *Diabetes Care* 2011; 34: 1133-8.
- Taheri E, Saedisomeolia A, Jalali M, Qorbani M, Madani Civi M. The relationship between serum 25-Hydroxy vitamin D concentration and obesity in type 2 diabetic patients and healthy subjects. *Diabetes metab Disord* 2012; 11: 16.