

Comparison of Vitamin D Levels in Fertile and Infertile Men

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ABSTRACT

Background: Vitamin D is known for its role in calcium metabolism and it has been also shown to be involved in fertility. Previous studies reported an association between the level of vitamin D and semen parameters. There are little studies regarding to this issue in Iranian men. So, we designed this study to assess vitamin D level in Iranian fertile and infertile men.

Method: A total of 207 male subjects (112 fertile and 95 infertile) were enrolled in this study. Vitamin D level and semen parameters were compared between the two groups.

Results: Mean age, duration of marriage and body mass index (BMI) were not significantly different between the two groups. Frequency of varicocele and previous opioid consumption were significantly higher in the infertile group than the fertile one. Sixty-six (71%) individuals in the infertile group and 61 (55%) in the fertile group had vitamin D levels < 20 ($p=0.02$).

Conclusion: Vitamin D deficiency (< 20) was significantly higher in infertile men.

Keywords: vitamin D, vitamin D deficiency, fertile men, infertile men.

INTRODUCTION

Vitamin D is well known for its role in bone metabolism. Recently, a wide range of roles has been also considered for vitamin D in medicine. The level of vitamin D differs across different geographical regions based on the level of exposure to sunlight, skin pigmentation, latitude, vitamin D intake, and air pollution (1, 2). We also know that vitamin D deficiency is related to hypertension, cardiovascular disease, stroke, diabetes, and cancer (3). It has been shown that vitamin D receptors were present in different parts of the male system involved in human reproductive axis (4). It is therefore reasonably to state that vitamin D has a direct effect on semen quality

(5). Previous studies have reported an association between the level of vitamin D and semen parameters (5). Given that there is only scarce research on this issue in Iranian men, we designed the present study to assess vitamin D levels in Iranian fertile and infertile men. □

METHODS

This case-control study was conducted in Amiralmomenin Hospital of Zabol University of Medical Sciences between March 2018 and March 2019.

Two groups of men were selected: a case group, comprising infertile men with unusual semen analysis findings, and a control group consisting in fertile men who were selected from

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hospital staff or patients' relatives. The case group included men with an infertility problem who had received the result of a prior vitamin D checkup, and the control group fertile men who had both vitamin D checkups for occupational or routine purposes and semen analysis.

All participants were asked to fill informed consent forms.

Semen collection was done by masturbation after 2–5 days of sexual abstinence according to the World Health Organization (WHO) recommendations (2010) and were analyzed within one hour of ejaculation.

CASA system [SPERM CLASS ANALYZER software (SCA) Microptic, Version 4.2, Barcelona, Spain] was used to assess sperm motility and concentration. The Makler chamber was used for motility scoring. Venous blood samples for vitamin D assessment were obtained by chemiluminescent immunoassay method by using the DiaSorin LIAISON 25-OH vitamin D total assay.

Data regarding age, duration of marriage, type of infertility, body mass index (BMI), cigarette smoking, opioid consumption and history of varicocele were recorded for all subjects.

Collected data were analyzed using SPSS software version 20 (SPSS Inc., Chicago, IL, USA) and then presented as mean±SD for continuous or frequencies for categorical variables. Independent sample t-test was used for continuous variables and chi-square for categorical variables. P-values less than 0.05 were deemed significant. □

RESULTS

One hundred and twelve fertile and 95 infertile men were enrolled in this study. Their basic characteristics are shown in Table 1.

Sixty six individuals in the infertile group (71%) and 61 (55%) in the fertile group had vitamin D level less than 20 (p=0.02).

Semen parameters in the case group with vitamin D levels higher or lower than 20 were not significantly different (Table 2).

Semen parameters in the control group with vitamin D levels higher or lower than 20 were not significantly different (Table 3). □

DISCUSSION

Results of the current study show that frequency of men with vitamin D levels less than 20

	Fertile group	Infertile group	P value
Age	31±7.4	30.1±5.1	0.3
Duration of marriage	5.2±7.6	4.6±4.3	0.4
BMI	24.2±4	25±3.9	0.1
Type of infertility			
Primary		70 (73.6%)	
Secondary		25 (36.4%)	
Occupation			
Employed	81 (72.3%)	70 (73.6%)	0.1
Unemployed	31 (37.7%)	25 (36.4%)	
Cigarette smoking	4 (3.5%)	9 (9.4%)	0.08
Opioid consumption	9 (8%)	19 (20%)	0.01
Varicocele	2 (1.8%)	18 (18.9%)	<0.001
Vitamin D	19.7±9.1	17.4±8.8	0.07

TABLE 1. Basic characteristics of the two study groups

	<20	≥20	p value
Sperm concentration (million/mL)	21±24	27.5±34.1	0.3
Motility (%)	51.6±34.5	54.6±31.7	0.6

TABLE 2. Semen parameters in patient group with vitamin D levels higher or lower than 20

	<20	≥20	p value
Sperm concentration (million/mL)	65.4±32	69.4±31	0.5
Motility (%)	74.9±17.1	71.8±16.8	0.3

TABLE 3. Semen parameters in control group with vitamin D levels higher or lower than 20

was significantly higher in infertile men than fertile ones. We also found no significant differences between semen analysis in cases and controls with and without vitamin D deficiency.

These findings are not in accordance with those of Akhavizadegan and Karbakhsh (6), who had compared serum vitamin D levels between 114 infertile men and 116 fertile men, and found that cases with serum vitamin D levels >20 had a better spermogram.

In a Chinese study, Yang et al found no relationship between vitamin D levels and spermogram (7). In both case and control groups, we found no significant difference between sperm concentration and motility in vitamin D deficient- and sufficient individuals.

Hammoud *et al* investigated how was serum vitamin D level was associated with semen parameters after controlling for age, BMI, season, alcohol intake and smoking (8). Blomberg Jensen and colleagues reported a positive association between vitamin D level and sperm motility (9).

On the other hand, Hammoud *et al* found that vitamin D level >50 ng/mL was associated with lower normal sperm head and reduced sperm motility (8), which was in accordance with the findings of Ramlau-Hansen *et al* (10). Other previous studies demonstrated that there was a U shaped relationship between vitamin D levels and sperm parameters (9, 11).

Evidence reveal a positive role of vitamin D in reproductive function of male and female individuals.

In an animal study, Kwiecinski *et al.* administered a vitamin D-deficient diet to rats and reported a 45% reduction in successful mating in comparison with the group that received a vitamin D-supplemented diet (12). In another study, vitamin D deficiency was related to 75% reduction in overall fertility (13).

Vitamin D is a steroid hormone which is known for its role in calcium metabolism. Nowadays, it is considered to be a risk factor for cancers, autoimmune diseases, and infectious diseases (14-16).

The occurrence of a vitamin D receptor in testis, epididymis, prostate, seminal vesicles and sperm head shows that vitamin D has crucial role in male fertility (17). On the other hand, vitamin D metabolizing enzymes were found in epididymis, seminal vesicles and the prostate (8). It can show its role in male fertility.

This study had some limitations. Firstly, it was conducted in a tertiary hospital. Secondly, the sample size was limited. Therefore, larger multicentric studies are recommended. □

CONCLUSION

Vitamin D deficiency (<20) was significantly higher in infertile men.

Conflicts of interests: none declared.

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