

Original Research Article

A Study on Vitamin D Condition in Infertile Women in Shiraz during 2014

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Abstract: The main objective of Infertility is a serious problem in women's lives and there are many reasons known for this issue. Micronutrient deficiencies, such as vitamin D, along with disorder in fertility, are reported in some studies. The objective in this research is to study the vitamin D condition in infertile women during their reproductive ages, between 20 and 40 in Shiraz and determining their relation with demographic and social characteristics. In methodology 180 infertile women admitted in Qadir Mother and Child Hospital was selected through simple random sampling and studied variables were tested in them. Also, blood sample was taken from them and their serum 25-hydroxyvitamin D levels were measured through ELISA. In this research, the normal level for vitamin D was appointed to be greater than or equal to 30 ng/ml and the serum level lower than 30 ng/ml was considered to be the deficit level. In results research findings suggested that among the 180 studied women, 95 (52.79%) of them had a vitamin D deficiency and 85 (47.22%) of them had normal level of vitamin D. The lowest level of vitamin D in studied women was 21.4 ng/ml and the highest level of that was 43.80 ng/ml. There was no significant difference observed between vitamin D condition and indices of age, education background, birthplace, job, physical exercise and income. Also, there was no significant difference found between vitamin D condition and weight, height and body mass index. In conclusion according to the findings, more than half of the infertile women had a vitamin deficiency and this could be considered as a problem for their fertility health and the deficiency is not due to the individuals' socioeconomic situation. Hence, focusing on preventive measures and early treatment seems to be of significance.

Keywords: vitamin D, infertility, demographic characteristics.

INTRODUCTION:

Infertility is one of the most common problems among human societies and according to the estimations of World Health Organization, 60-80 million couples are suffering from this problem, worldwide [1]. There has been many reasons mentioned for infertility in women and micronutrient deficiencies are reported to be among these factors. In some studies, a negative relation between vitamin D level and success in fertility has been reported.

Vitamin D is one of the fat-soluble vitamins which was discovered in 1930 and named calciferol [2]. Factors such as age, skin pigmentation, obesity, physical activity, seasonal changes, sunlight and receiving nutrients could impact the blood vitamin D level. Skin pigmentation impacts the vitamin D level [3].

Vitamin D deficiency is described as the cause of metabolic bone diseases such as rickets, osteomalacia, osteoporosis and finally weakness and loss of muscle mass, but recent information has revealed the impact of this vitamin deficiency in decreased immune system, especially forming pneumonia in children, decrease in fertility, increase in age at menarche, decrease in insulin response to glucose, decrease in cardiac contractility, hypertension and infertility [4].

The major part of the vitamin D is transformed to skin due to the UV radiation. Vitamin D is found in foods such as fatty fish species and egg. Moderate amount of vitamin D is derived from food resources such as fatty fish species or supplements [4].

High prevalence of vitamin D deficiency is among the main health issues in today's world. During

the recent years, it was assumed that the epidemic of this vitamin deficiency had been controlled. However, recent studies indicate that new epidemics have been emerged due to the vitamin D deficiency [6]

Vitamin D deficiency is a common and significant problem for women in fertility ages in developing countries, unfortunately [7]. Hence, vitamin D deficiency is considered as one of the concerns in healthcare systems and current evidence suggests the widespread prevalence of this vitamin deficiency in both sick and healthy individuals [8].

Despite the abundant UV radiation in tropical countries, some studies show the prevalence of vitamin D deficiency in these regions. Vitamin D deficiency is especially common in the Middle East. Factors such as avoiding sun exposure, applying sunscreens, women's clothing, high number of skin pigments in Asians could be its main causes [9]. 25-hydroxyvitamin D level test in blood circulation provides a general evaluation of vitamin D, derived from all vitamin D sources such as food diet, supplements and sunlight exposure, and it is considered as the best body supply index [10].

In Australia, vitamin D deficiency has had 70 to 80 percent prevalence among seniors and pregnant women and its prevalence is around 23 percent among young adults [11].

The studies conducted by Endocrinology and Metabolism Research Center of Tehran University of Medical Sciences in cooperation with Health Department of the Ministry of Health and Medical Education in five cities in Iran, indicate the prevalence of this vitamin deficiency between 40 and 80 percent on various regions [12].

In this research, the infertile women admitted in Shiraz Qadir other and Child Hospital were selected as one of the groups exposed to vitamin D deficiency and the objective in this research is to determine the vitamin D serum concentration in infertile women and determining its relation with age, weight, height, body mass index, job, education background, birthplace, economic activities and physical activities.

METHODOLOGY:

This research is a cross-sectional study of descriptive-analytical type which was conducted on women at the fertility age of 20-40 as a sample of the group exposed to vitamin D, at Shiraz Qadir other and Child Hospital. The objective in this research was to study the vitamin D condition in women in fertility ages and its relation with their demographic data.

Inclusion criteria included: consent to participate in the study and filling up the written

consent, not being diagnosed with bone diseases, kidney disease, disorders of endocrine glands, chronic digestive disorders and all diseases which have specified and proven impacts on vitamin D metabolism, not taking vitamin D and calcium supplements at least one month before the study (oral in two weeks before the study and injection in six months) and not taking medications which have proven impact on serum amounts of these compounds, such as anticonvulsants, opioids, cardiac drugs, hypertension drugs, cimetidine, theophylline, cholestyramine, etc. Exclusion criteria included being diagnosed with diseases influencing vitamin D level and lack of consent with participating in the study.

Simple purposive sampling was used in this study. After checking women based on inclusion criteria, they were asked to fill out the written consent and a questionnaire for collecting their personal information including the demographic data. Subsequently, 5 cc bloods were taken from them and their serum 25-hydroxyvitamin D levels were measured using ELISA. 25-hydroxyvitamin D levels lower than 30 ng/ml were considered to be the deficit level and levels greater than 30 ng/ml were appointed to be normal.

In order to insert data in the computer and carrying out the calculations, SPSS ver. 16 was used. To describe the data, indices of mean, standard deviation and to study the relation between vitamin D and studied variables, chi square and independent T were used. The significance level was appointed to be 0.05.

Individuals were assessed in two urban and rural groups based on their birthplace, since the epidemic of vitamin D deficiency was first emerged around 300 years ago, subsequent to migrating to the centers of industrial cities and sunlight deprivation and in developing countries in the beginning of twentieth century, with the growth of urbanization, this vitamin deficiency caused the prevalence of rickets and osteomalacia.

Individuals were assessed in five illiterate, primary school, junior high school, high school, and university groups based on their education level. Also, they were assessed in three housewives, employees and other businesses groups based on their job status.

FINDINGS:

Results from this study suggests that 95 (52.79%) of the women had a vitamin D deficiency and 85 (47.22%) of them had normal level of vitamin D. The average vitamin D serum level in studied individuals was estimated to be 31.60 ± 5.17 ng/ml.

Table 1 presents the average 25-hydroxyvitamin D concentration in two groups of vitamin D deficiency and normal level in infertile

women and the lowest level of vitamin D in studied women was 21.4 ng/ml and the highest level of that was 43.8 ng/ml.

Table 1: The frequency of vitamin D deficiency in infertile women

Vitamin D status	Number	Percentage	Vitamin D level (mean standard division)	Min	Max
Deficiency	95	52.78%	27.58±1.83	21.40	30.00
Normal	85	47.22%	36.15±3.76	30.01	43.80
Total	180	100%	31.60±5.17	21.04	43.80

Table 2 focuses on anthropometric characteristics of infertile women in two groups of vitamin D deficiency and normal level, and four indices of weight, height, age and body mass index have been

assessed in this table. The average age in studied individuals was 32.36±5.07 years. Also, there was no significant difference found between the two groups, after studying the anthropometric indices.

Table 2: Anthropometric characteristics of infertile women in the group of low and normal levels of vitamin D

Variables	Vitamin D deficiency group	Vitamin D sufficiency group	Total	p-value
Age (mean standard division)	31.97±5.06	32.80±5.08	32.36±5.07	0.28
weight	64.56±9.28	65.18±9.85	65.86±9.53	0.665
Height	160±4.81	160±5.75	160±5.26	0.946
BMI	25.12±3.28	25.44±3.90	25.27±3.58	0.548

Table 3 focuses on demographic indices of infertile women in two groups of vitamin D deficiency and normal level, and three indices of birthplace, job status and education level have been assessed in this

table. Also, there was no significant difference found between the two groups, based on birthplace, job status and education level, which is expressed in Table 3.

Table 3: demographic of women ages infertile levels of vitamin D deficiency and normal levels

Variables		Vitamin D deficiency group	Vitamin D sufficiency group	Total	p-value
birthplace	urbane	68	52	120	0.139
	Rural	27	33	60	
job status	housework	74	63	137	0.179
	jobholder	21	19	40	
	Other job	0	3	3	
education level	illiterate	0	2	2	0.504
	Primary school	18	20	38	
	Secondary school	17	15	32	
	High school	27	19	46	
	undergraduate	33	29	62	

Table 4 focuses on indices of economic condition and physical activity of infertile women in two groups of vitamin D deficiency and normal level, and in this table, income is considered as an indicator of economic condition and exercising as an indicator of

physical activities. Also, there was no significant difference found between the two groups, based on income per month and physical activity based on minutes per week, which is expressed in Table 4.

Table 4: The economic situation index and physical in two groups

Variables	Vitamin D deficiency group	Vitamin D sufficiency group	Total	p-value
Income	994±656	971±647	983±650	0.818
Exercise(min/week)	32.73±86.61	33.52±80.84	33.66±83.64	0.953

DISCUSSION:

Results from this study show that 52.78% of the studied women had a vitamin D deficiency. In the study of Garabedian *et al.*; which was carried out on infertile women, it was shown that among 173 infertile women, 95 women (54.9%) had a vitamin D deficiency [14] and in another study by Roddick *et al.*; which was conducted on the study of the vitamin D impact on the results of in vitro fertilization among 188 infertile women in 2012, it was indicated that 109 women (58%) had a vitamin D deficiency (levels lower than 30 ng/ml), and both studies are in accordance with the results from current study [15].

In contrast to these studies, in a study conducted by Aflatoonian *et al.*; which was carried out to study the vitamin D treatment impacts on the results of in vitro fertilization among 128 infertile women in 2014, it was found out that 114 women (89%) had a vitamin D deficiency and in the study conducted by Firouzabadi *et al.* in 2014, which focused on the predicting value of vitamin D level on results of in vitro fertilization, among 221 infertile women, 92.7% (205 women) had a vitamin D deficiency (lesser than 30 ng/ml) and 7.3% (16 women) had a serum vitamin D level greater than 30 ng/ml [17].

In the two studies of Aflatoonian and Firouzabadi which were conducted in Iran and Yazd, a high prevalence of vitamin D deficiency was reported. Although the results from these studies are in accordance with the results from the study carried out in five cities of Iran by Moradzade *et al.*; which were carried out in 2006, the prevalence of this vitamin deficiency was around 40-80 percent in various regions [18].

It is observed that vitamin D condition is different among various societies and this could be attributed to the variation of factors impacting vitamin D level. Among these factors could be referred to the season, geographical location, clothing, applying sunscreens, and pigmentation rate in individual's skin, sunlight angle effect, and vitamin D intake from food [19].

On studying the relation between vitamin D and job status, there was no significant difference observed between the vitamin D deficiency group and normal group.

Individuals in this study were also studied based on residential locations and among the urban population 56.6% and among the rural population 45% had a vitamin D deficiency. This difference shows that the rural population has a higher access to the materials rich with vitamin D. also, the rural population was more exposed to the sunlight, while the urban population has a lower sunlight exposure due to the apartment living

and it is recommended that this population consume more materials enriched with vitamin D.

There was no significant difference found between vitamin D condition and education background in the vitamin D deficiency group and normal group ($p=0.504$). This indicates that individuals with higher education do not necessarily have a higher nutrition literacy to benefit from vitamin D sources, such as fish and cod liver oil.

In this research, the age average of the vitamin D deficiency group was 31.97 ± 5.06 years and the age average of the normal group was 32.80 ± 5.08 years and there was no significant difference found between these two groups ($p=0.28$).

In the study conducted by Franasiak *et al.*; on infertile women, the age average of the vitamin D deficiency group was 34.8years, while the age average of the normal group was 36.4years [20]. In the study conducted by Fabris *et al.*; on infertile women, the age average of the vitamin D deficiency group was 40.85years while the age average of the normal group was 40.4years [21]. In the study conducted by Aflatoonian *et al.*; on infertile women having a vitamin D deficiency, the age average was reported to be 29years [22].

In this research, the BMI in the vitamin D deficiency group was 25.12kg/m^2 , while the BMI in the normal group was 25.44kg/m^2 .

In the study conducted by Franasiak *et al.*; on infertile women, the BMI of the vitamin D deficiency group was 25.4kg/m^2 , while the BMI of the normal group was 24.1kg/m^2 [23]. In the study conducted by Fabris *et al.*; on infertile women, the BMI of the vitamin D deficiency group was 23.2kg/m^2 , while the BMI of the normal group was 21.2kg/m^2 [24]. In the study conducted by Aflatoonian *et al.*; on infertile women having a vitamin D deficiency, the BMI of was reported to be 26.58kg/m^2 [25].

Obesity was a risk factor for vitamin D deficiency. Considering the role of fat tissue as a place for storing vitamins, obese individuals have a higher storing capacity for vitamin D, which leads to a decrease in serum level of this vitamin [26]. Also, obesity leads to a decrease in bioavailability of vitamin D, due to the storage of vitamin D in fat tissues [27].

In a study which was conducted by Rodick *et al.*; in 2012 on BMI, women with a vitamin D deficiency had a higher BMI comparing to the women without a vitamin D deficiency ($p=0.03$) [7]. In a meta-analysis which was carried out on 42,000 adult patients, it was suggested that high BMI leads to a decrease in

vitamin D level. 10% of increase in BMI results in 4% decrease in vitamin D level, while the vitamin D deficiency has a very small impact on BMI. This problem suggests that obesity is a causal factor in vitamin D deficiency, while vitamin D deficiency is not a causal factor in obesity [29]. Considering the conducted studies, it is observed that vitamin D deficiency does not have any impact on BMI and there was no significant difference found between BMI in two groups ($p=0.54$).

CONCLUSION:

According to the findings in this research, vitamin D deficiency is common among the infertile women during fertility ages. This fact requires design and implementation of further studies with a focus on the reason for vitamin D deficiency among this group. Also, implementation of enrichment programs and therapeutic supplement could be of a great help in preventing this.

This study showed that more than half of the infertile women admitted at healthcare centers have a vitamin D deficiency and since this vitamin has a great role in fertility and its continuity, its use is recommended in order to improve the fertility condition. Also, women with any BMI are exposed to the risk of vitamin deficiency. Factors such as income and education background do not prevent vitamin deficiency. However, residence location and exposure to the sunlight could impact the vitamin D supply to some extent and further treatment is needed in urban areas.

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