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Is vitamin D deficiency topical for inflammation?

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Abstract.

Currently, vitamin D deficiency has become a common condition in many people all over the world. It is wide spread in different countries including sunny ones. Moreover, a significant number of patients with chronic inflammatory diseases and autoimmune disorders are deficient or insufficient in vitamin D. Purpose of study – To evaluate the incidence of vitamin D deficiency in patients with recurrent and chronic inflammatory diseases and autoimmune disorders. A retrospective analysis of 59 patient's electronic medical cards with recurrent and chronic inflammatory and autoimmune diseases has been applied for revealing vitamin D insufficiency frequency. We have found that almost all of the patients had non-optimal levels of vitamin D. The study has concluded that Vitamin D deficiency and insufficiency are common in patients with recurrent and chronic inflammatory diseases of the respiratory system, urinary tract, and inflammatory polyarthropaties as well as in patients with autoimmune disorders. This demonstrates the necessity of testing and restoring the level of vitamin D in these groups of patients.

Keywords: vitamin D, immunity, recurrent inflammatory diseases, chronic diseases, autoimmune disorders.

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Introduction:

Currently, vitamin D deficiency has become a common condition in many patients all over the world.

Vitamin D deficiency is widespread in areas with low saturation levels, moreover, there is a seasonal fluctuation in the values of the serum level of this vitamin [1]. We cannot also ignore its spread in sunny countries, for example, in Libya. A group of researchers have been done regarding vitamin D deficiency in Libya show that many patients suffer from vitamin D deficiency [2]. In addition, in the middle region of Libya vitamin D deficiency is common [3].

The main role of vitamin D is the regulation of phosphorus-calcium metabolism and bone metabolism; however, some other regulatory functions have been identified. Vitamin D deficiency is associated with a number of diseases, in particular bone disorders, and both autoimmune and cardiovascular diseases. In addition, vitamin D deficiency plays a role in chronic and recurrent inflammatory diseases [4].

Binding of 1,25(OH)2D to the intracellular vitamin D receptor regulates more than 900 genes involved in many physiological processes, including both innate and adaptive immunity [5].

Considering that vitamin D has immune-modulating properties, many studies have focused on its role in immune system

modulation [6]. It was shown that this supplement could regulate innate immune response, inducing the production of antimicrobial peptides (cathelicidin and β-defensin 2), normalizing natural killers function, inhibiting phospho-ligand-induced γδ T-cell expansion and IFN-γ production. In addition, it regulates the expression of hepcidin (an antibacterial agent), and modifies the signaling pathways that bind respiratory viruses.

Respiratory infections are a significant cause of morbidity and mortality worldwide. Moreover, recurrent respiratory infections can be important modifiers of disease progression and are key drivers of the exacerbation of many chronic lung diseases. Chronic inflammatory diseases of the upper and lower respiratory tract both localized in the urinary tract can dramatically decrease patients' quality of life. It means that topicality of these diseases is not in doubt.

The best method to diagnose vitamin D deficiency is measuring the level of 25 (OH) D in the serum. The concentration of vitamin D (25 (OH) D) in the blood serum of <10 ng / ml (25 nmol/L) is defined as severe vitamin D deficiency, <20 ng / ml (50 nmol/L) - vitamin D deficiency, 20-30 ng / ml (50–75 nmol/L) - vitamin D insufficiency, > 30 ng / ml (75 nmol/L) – optimal level and > 150 ng/ml (375 nmol/L) - toxic level [7].

It is proven that restoring vitamin D levels in the blood has immunomodulatory properties, which improve innate and adaptive immunity [8].Concerning vitamin D possible immunomodulating properties, it would be very useful to assess if supplying with it can improve health state in patients with recurrent and chronic inflammatory diseases as well as in those with autoimmune disorders.

Aim of the work:

To assess the incidence of vitamin D deficiency in patients with recurrent and chronic inflammatory diseases and autoimmune disorders.

Subjects and methods:

We have conducted a retrospective analysis of electronic medical cards of 59 patients with recurrent and chronic inflammatory diseases, observed in the Healthcare Institution "Vitebsk Regional Diagnostic Center" in 2019. The next data were analyzed: gender and age characteristics of included patients, the spectrum of diagnosed pathology, and vitamin D level.

Testing for vitamin D level (25(OH)D) was done in fasting serum by the method of Chemiluminescence immunoassay with «MAGLUMITM 800» analyzer. Statistical analysis was performed with STATISTICA 12. Concerning the number of cases and distribution characteristics methods of nonparametric analysis were used. Data were described using Median meaning (Me) and quartile range.

Results:

30 patients with chronic and recurrent inflammatory diseases (21 women and 9 men) at the age from 22 to 69. were examined (Me 43,5 [33,3 :54,8])., their gender and age characteristics are shown in table 1.

Table 1. Distribution of patients in accordance with age (n=30)

Gender	Age
Men (n=9)	42.5 [33.8 - 54.0]
Women (n=21)	43.5 [33.3- 54.8]

The spectrum of revealed patients' pathology is shown in table 2.

Table 2. Patient's pathology explained in numbers and percentage (n=30)

Diseases	Number of patients	%
Recurrent acute respiratory diseases	22	73%
Chronic tonsillitis, rhinosinusitis, pharyngitis	5	17%
Chronic bronchitis	3	10%
Chronic prostatitis	6	20%
Chronic pyelonephritis, cystitis	4	13%
Chronic inflammatory diseases of female genital organs (salpingitis, oophoritis, cervicitis)	6	20%

30% of patients had combined chronic inflammatory diseases of different localization. 27% of patients were comorbid with gastrointestinal tract disorders (chronic gastritis, gastroesophageal reflux disease, irritable bowel syndrome, chronic cholecystitis).

The results of vitamin D testing are represented in table 3.

Table 3. Serum vitamin D in patients.

Serum vitamin D	Number of patients and %	Severity	Number of patients and %
Low level of serum vitamin D	27 (90%)	Insufficiency	12 (40%)
		Deficiency	15 (50%)
Normal level of serum vitamin D	3 (10%)		

The majority of patients (90%) had no normal serum vitamin D level– Me 18,6 [13,9: 24,7] ng/ml. The median level of vitamin D in women (18,7 [14,0: 21,0] ng/ml was lower than in men (24,7 [13,6: 27,0] ng/ml). Our data can confirm the predisposition about immunomodulating role of vitamin D. Concerning its anti-inflammatory properties [3], restoring of the normal level of vitamin D in patients with inflammatory diseases can decrease exacerbations frequency and severity of diseases.

Moreover, laboratory and clinical data of 29 patients (28 women and 1 man) with autoimmune diseases and inflammatory polyarthropaties were analyzed. The age median was 51 [44.8 – 62.5] years old. Among observed patients' rheumatoid arthritis, gout, psoriatic arthropathy, reactive arthritis, periarteritis nodosa, mixed connective tissue disease, Sjogren's syndrome, ankylosing spondylitis, hemorrhagic vasculitis, giant cell arteritis was diagnosed. The optimal level of vitamin D was seen only in 3 patients (10,3%). Vitamin D deficiency was stated in 15 (51,7 %), and insufficiency – in 11 (38%). These data confirm the topicality of vitamin D level detection and correction in patients with autoimmune and inflammatory disorders.

Discussion:

Our data showed a higher detection rate of vitamin D deficiency and insufficiency in the studied groups compared to the data obtained from the screening examination of adults living in the territory of the Republic of Belarus. According to Rudenka. Normal

serum levels of vitamin D were detected in 27.5% of healthy people, and deficiency was observed in 31% of the examined [9].

Conclusions.

1. We have found that almost all patients (90%) with recurrent or chronic inflammatory diseases, inflammatory polyarthropaties, and autoimmune disorders had vitamin D level that was lower than optimal. The data obtained indicate a higher prevalence of non-optimal vitamin D levels in patients with chronic and recurrent inflammatory diseases of various natures compared to healthy people.
2. Nearly half of the patients had vitamin D deficiency.
3. Based on these results and literature analysis data, supplementation with vitamin D can be helpful for the majority of patients with recurrent and chronic inflammatory diseases and autoimmune disorders.
4. It seems interesting to study the dependence of the prevalence of chronic inflammatory diseases and the frequency of their exacerbations on the vitamin D level in patients living in sunny countries (for example, Libya).
5. It is important that we understand this association better in order to identify the minimum (and maximum) vitamin D levels required for normal immune function, and when to intervene if necessary. To achieve this end, we need a thorough understanding of the importance of vitamin D in determining the onset of disease, progression of disease.

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