Correlation of Oral Vitamin D Administration with the Severity of Psoriasis and the Presence of Metabolic Syndrome

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To improve the management of psoriasis, we have started from the hypothesis that normalization of vitamin D serum reduces the severity of psoriasis and positively influences the diagnostic criteria of metabolic syndrome. Experimental part. The objective of the prospective study was to evaluate the impact of oral vitamin D on psoriasis and metabolic syndrome in a group of 184 patients diagnosed with psoriasis and metabolic syndrome, between 2010-2017. In all patients included in the study, we evaluated family history, personal medical history, the living and working conditions, the history of psoriatic disease (control group only), clinical data (waist circumference), height (cm), body mass index, blood pressure (mmHg) and laboratory examinations. Regarding the severity of psoriasis, in all 141 patients treated with vitamin D, a significant improvement was seen after 12 months of treatment. We bring a new approach to the treatment of psoriasis with vitamin D.

Keywords: psoriasis, vitamin D, metabolic syndrome.

Psoriasis is a chronic, inflammatory, proliferative disease [1]. It is most often characterized by well-defined, red, erythematous plaques, covered with thick white patches [2,3]. Psoriasis is associated with multiple comorbidities, such as metabolic syndrome, cardiac disorders, arthritis [4-7].

The reported lifetime prevalence of psoriasis increased from 4.8% in 1979-1980 to 11.4% in 2007-2008. Recent studies showed an increase in psoriasis prevalence, the number of cases nearly doubled between the 1970s and 2000, the reason being still unknown [8,9].

Psoriasis can occur regardless of age, from birth to old age; generally, the age of onset is between 15 and 30 years [10,11]. It is common in both men and women, and there are no morphological differences between the sexes [10,12-14].

Pathogenesis of psoriasis is still unknown, however it is generally accepted to be a chronic inflammatory disease with a complex skin reaction. The dendritic cells of the dermis and epidermis are activated at onset and worsening of the disease, producing TNF-alpha and IL-23 messengers, leading to the preferential development of T, Th1 and Th17 cells that migrate and proliferate epidermal cells [15,16].

Topical treatment of psoriasis includes: corticosteroids, anthralin, vitamin A, synthetic vitamin D3. Phototherapy includes UVB, UVB laser and PUVA. Systemic therapy includes: cyclosporine, methotrexate, retinoid receptor inhibitors; in biological therapy: TNF-alpha inhibitors and cytokine inhibitors such as anti-IL23p40 and IL-17 inhibitors [17].

Over time, the metabolic syndrome was known as: plurimetabolic syndrome, X syndrome, X plus syndrome, metabolic syndrome X, cardiovascular metabolic syndrome, insulin resistance syndrome - dyslipidemia, etc [18,19].

Studies in many countries show a considerable difference in the prevalence of metabolic syndrome, from 10 to 84%, depending on race, age, gender, ethnicity [20,21].

Recent studies have estimated a prevalence of metabolic syndrome of 15%-24% in the general population and 30%-50% in psoriasis patients, this high percentage necessitating an appropriate treatment approach for these patients [22,23].

The relationship between psoriasis and metabolic syndrome is probably bidirectional, meaning that psoriasis favors metabolic syndrome and metabolic syndrome predisposes to psoriasis, both of which have vitamin D deficiency, the essential hormone that has the effect of chronic inflammation, the common element in the pathophysiology of the two diseases [18,24].

In addition to its well established function as the central regulator of bone and mineral homeostasis, 1,25 (OH)2 D3 (1,25-dihydroxyvitamin D3) (fig. 1), the active form of vitamin D, has been rediscovered as a modulator of cell growth and differentiation, including immune system cells [25-28].

Fig. 1. Chemical structure of the 1,25-dihydroxyvitamin D3 (Calcitriol)
Vitamin D deficiency (25-hydroxyvitamin D3 or 25 (OH) D3) (fig 2.) influences health and exacerbates pre-existing diseases such as psoriasis, osteoporosis, rickets, autoimmune diseases, cancer, diabetes and cardiovascular diseases [29,30].

Hypervitaminosis D can cause cardiac arrhythmias, anorexia, polyuria, weight loss, increased calcium levels, leading to tissue calcification and vascular wall damage to the heart, kidneys and arteries.

The importance of vitamin D in psoriasis has been shown to be both the efficacy of vitamin D derivatives in the skin’s treatment of this disease, as well as the effectiveness of ultraviolet exposure, resulting in increased plasma concentrations and regression of psoriatic lesions in the skin [31].

Experimental part
The main objective of the study was to assess the correlation between oral vitamin D and evolution of patients diagnosed with vulgar psoriasis and vitamin D deficiency. The study period was between 2010-2017.

Criteria for inclusion in the study
The study group included 141 patients with psoriasis and 43 with metabolic syndrome, selected with the help of family doctors from Bucharest and Ilfov, and from Elias Emergency University Hospital, Bucharest. The control group included patients who came to control for other diseases, not influencing the research, and the general population, ≥ 18 years of age.

Patients with contraindications for standard systemic therapy and/or biological treatment were included in the study.

Exclusion criteria from the study
Patients who received treatment that may lower vitamin D levels have been excluded from the study. Regarding patients with psoriasis, those who underwent standard or biological systemic therapy were excluded.

Also, those who took oral vitamin D supplements in the last 6 months before enrolling in the study were excluded. In addition to medication, the exclusion criteria was applied to those who suffered from epilepsy, asthma, tuberculosis, Crohn disease, malabsorption (intestinal resection, cystic fibrosis, celiac disease), genetic malformations, liver disease, endocrine disorders, kidney disease, sarcoidosis.

Tracking Parameters
In phase I, the baseline of the study, we followed the control of the severity of psoriasis that was calculated according to the BSA (Body Surface Area) score, taking into account the affected skin surface [32].

We searched the presence of metabolic syndrome in both groups. We used the diagnostic criteria of the metabolic syndrome, the criteria of the International Diabetes Federation (IDF) [33].

The serum level of vitamin D was determined, in order to assess the deficiency. Then, vitamin D oral administration was recommended in all patients, with both psoriasis and metabolic syndrome, which have been found with deficient or insufficient levels of vitamin D.

Statistical analysis
All the data obtained was introduced into Microsoft Excel, in order to be processed and statistically analyzed. For the relationship coefficient, we took into account R = 1 = perfect correlation. We took into account the statistical significance threshold p <0.05 for the validity test. The confidence interval of 95% for the variance ranges of the studied parameters has been respected.

Study limitations
Urban predominance, time limitation (12 months) and territorial limitation (Bucharest and Ilfov).

It was difficult to quantify the sun exposure, influenced by season, latitude, pollution, clouds, fog, skin color, age. The daily intake of vitamin D from food sources during the study was not monitored. There were patients in the study groups with topical vitamin D treatment, and the degree of dermal absorption was difficult to quantify.

Results and discussions
Comparison of values of Vitamina D before and after administration
Following oral vitamin D administration, increases in serum were observed (fig 3). Following these increases of vitamin D, changes in the severity of psoriasis have been observed.

Influence oral vitamin on the severity of Psoriasis
Following the severity of psoriasis in all 141 patients treated with vitamin D, a significant improvement was seen after 12 months of treatment (fig. 4)

We analyzed the downward trend of each category and outlined it in figures 5, 6 and 7.
There have been very few cases where psoriasis has worsened after vitamin D treatment, namely a case with moderate psoriasis evolved to severe psoriasis and two cases of mild psoriasis worsened to moderate psoriasis. The worsening may be due to the patient’s failure to take the treatment as recommended.

We analyzed the severity distribution based on the presence or absence of metabolic syndrome. The presence of metabolic syndrome negatively influences the severity of psoriasis, the number of cases of severe psoriasis with metabolic syndrome and vitamin D
The proportion of patients with metabolic syndrome, psoriasis and vitamin D deficiency is 56%. In the studied group, 44% were patients with psoriasis, without metabolic syndrome, with vitamin D deficiency, out of a total of 141 who have psoriasis and vitamin D deficiency.

The downward trend in the severity of psoriasis following vitamin D treatment can be observed. There is a clear and significant reduction in the number of severe psoriasis patients. In general, severity reduction occurred gradually, there were no patients with severe psoriasis who, after 12 months of treatment, entered the remission.

Taking into account the maximum allowed dose of vitamin D of 4000 IU/day for adults, we considered the maximum allowed dose as a threshold for administration to deficient patients.

Sun exposure and sun protection were analyzed in all study participants. The degree of sun exposure decreases with the increase in the severity of psoriasis in the studied group.

Table 1

<table>
<thead>
<tr>
<th>Initial severity of psoriasis in patients with MS (N)</th>
<th>Severity after 12 months of treatment with vitamin D (N)</th>
<th>Initial severity of psoriasis in patients without MS at 12 months (N)</th>
<th>Severity after 12 months of treatment with vitamin D (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe (28)</td>
<td>Severe - 8</td>
<td>Severe (6)</td>
<td>Severe - 1</td>
</tr>
<tr>
<td></td>
<td>Moderate - 20</td>
<td></td>
<td>Moderate - 3</td>
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<tr>
<td></td>
<td>Mild - 0</td>
<td></td>
<td>Mild - 2</td>
</tr>
<tr>
<td></td>
<td>Remission - 0</td>
<td></td>
<td>Remission - 0</td>
</tr>
<tr>
<td>Moderate (32)</td>
<td>Severe - 1</td>
<td>Moderate (25)</td>
<td>Severe - 0</td>
</tr>
<tr>
<td></td>
<td>Moderate - 15</td>
<td></td>
<td>Moderate - 13</td>
</tr>
<tr>
<td></td>
<td>Mild - 16</td>
<td></td>
<td>Mild - 11</td>
</tr>
<tr>
<td></td>
<td>Remission - 0</td>
<td></td>
<td>Remission - 1</td>
</tr>
<tr>
<td>Mild (19)</td>
<td>Severe - 0</td>
<td>Mild (31)</td>
<td>Severe - 0</td>
</tr>
<tr>
<td></td>
<td>Moderate - 0</td>
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<td>Moderate - 2</td>
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<td></td>
<td>Mild - 12</td>
<td></td>
<td>Mild - 25</td>
</tr>
<tr>
<td></td>
<td>Remission - 7</td>
<td></td>
<td>Remission - 4</td>
</tr>
</tbody>
</table>

In our study, we have found an increase in the mean baseline values of vitamin D in patients with metabolic syndrome from \(18.27 \pm 6.744\) to \(47.81 \pm 6.107\), after 12 months of treatment.

A 12-month study on 59 patients with metabolic syndrome showed elevations of vitamin D serum by diet and exposure to the sun with an initial mean of \(19.1 \pm 1.5\) and a mean after 12 months of \(28.4 \pm 1.5\) \([37]\).

The results of our study sustain the necessity of an awareness campaign among family doctors on the correlation of psoriasis - metabolic syndrome - vitamin D.

In addition to the awareness campaign, a screening program for the presence of metabolic syndrome, risk factors and evaluation of vitamin D serum levels among psoriasis patients is required \([38,39]\).

Conclusions

In conclusion, the results of the current study open a new perspective in addressing and treating psoriasis. Patients with psoriasis are prone to develop metabolic syndrome. The predisposition increases in parallel with the severity of psoriasis and the number of years of illness.

The main novelty of our study is represented by the beneficial effects of systemic treatment with vitamin D on the severity of psoriasis, as well as on the components of the metabolic syndrome. There is no other research on this topic in the national and international literature.

References

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