

Evaluation of the role of vitamin D in patients with psoriasis

Avaliação do papel da vitamina D em pacientes com psoríase

Evaluación del papel de la vitamina D en pacientes con psoriasis

Received: 10/30/2023 | Revised: 11/13/2023 | Accepted: 11/15/2023 | Published: 11/18/2023

Isabel Caroline Zanatta Pedon

ORCID: <https://orcid.org/0000-0002-2208-3965>

Atitus Educação, Brazil

E-mail: isabelpedon@gmail.com

Gabriela Martins Fim

ORCID: <https://orcid.org/0000-0003-2919-1253>

Atitus Educação, Brazil

E-mail: gabiifim@gmail.com

Nathalia Kaminski Della Libera

ORCID: <https://orcid.org/0009-0008-6409-4161>

Atitus Educação, Brazil

E-mail: nathaliakaminski01@gmail.com

Alexandra Brugnera Nunes de Mattos

ORCID: <https://orcid.org/0000-0002-7284-7193>

Atitus Educação, Brazil

E-mail: Alexandra.Mattos@atitus.Edu.br

Abstract

Objectives: Investigate whether there is any association between the levels of vitamin D in the blood and the seriousness of psoriasis or its development. **Methods:** The study is characterized as observational, retrospective, composed of 40 patients with psoriasis who had serum vitamin D levels, who underwent clinical care at a dermatology outpatient clinic in Passo Fundo/RS, from August 2019 to June 2021. **Results:** Of the 40 interviewees, 60% were female and 40% male. Phototypes II and III prevailed. Regarding family health history, 50% had a history of the disease. Regarding the duration of psoriasis, the predominant group was between 1-10 years (57.5%). The most prevalent psoriasis subtype was vulgaris (62.5%). Regarding serum vitamin D results, the lowest index was 15.2 ng/mL, the highest was 42.3 ng/mL and the average was 25.99 ng/mL. In the predominant age group, between 20-40 years, the proportion of patients with vitamin D was less than 30 ng/mL is 83.33%. The lower the phototype, the greater the proportion of patients with suboptimal serum vitamin D. In the group of patients with disease duration > 10 years, vitamin D levels were lower. There is no extreme difference in the effectiveness of treatments when analyzing the average, minimum and maximum serum levels of vitamin D. **Conclusion:** There was no relationship between serum levels of 25-hydroxyvitamin D (25OHD) and the development of psoriasis or even control – worsening of the clinical picture of disease.

Keywords: Psoriasis; Vitamin D; Immune system.

Resumo

Objetivos: Investigar se há associação entre os níveis séricos de vitamina D e a gravidade da psoríase ou mesmo o seu desenvolvimento. **Métodos:** O estudo caracteriza-se como observacional, retrospectivo, composto por 40 pacientes com psoríase que apresentavam dosagem sérica de vitamina D e que foram atendidos em um ambulatório de dermatologia de Passo Fundo/RS, no período agosto de 2019 a junho de 2021. **Resultados:** Dos 40 entrevistados, 60% eram do sexo feminino e 40% do sexo masculino. Prevaleceram os fototipos II e III. Referente ao histórico familiar, 50% tinha histórico da doença. Sobre a duração da psoríase, o grupo predominante foi entre 1-10 anos (57,5%). O subtipo de psoríase mais prevalente foi a vulgar (62,5%). Em relação aos resultados de vitamina D sérica, o menor índice foi 15,2 ng/mL, o maior foi 42,3 ng/mL e a média foi 25,99 ng/mL. Na faixa etária predominante, entre 20-40 anos, a proporção de pacientes com vitamina D menor que 30 ng/mL é de 83,33%. Quanto menor o fototipo, maior a proporção de pacientes com vitamina D sérico abaixo do ideal. No grupo de pacientes com duração da doença > 10 anos, o nível de vitamina D apresentou-se mais baixo. Não há diferença extrema quanto a eficácia dos tratamentos ao analisar a média, mínimos e máximos de níveis séricos de vitamina D. **Conclusão:** Não houve relação dos níveis séricos de 25-hidroxivitamina D (25OHD) e o desenvolvimento da psoríase ou mesmo do prognóstico da doença.

Palavras-chave: Psoríase; Vitamina D; Sistema imune.

Resumen

Objetivos: Investigar la asociación entre los niveles séricos de vitamina D y el pronóstico de la enfermedad. **Métodos:** Se trata de un estudio observacional y retrospectivo de 40 pacientes con psoriasis que tenían niveles séricos de vitamina D y fueron atendidos en un ambulatorio de dermatología en Passo Fundo/RS, entre agosto de 2019 y junio de 2021. **Resultados:** De los 40 entrevistados, el 60% eran mujeres y el 40% hombres. Predominaron los fototipos II y III. En cuanto a la duración de la psoriasis, el grupo predominante fue entre 1-10 años (57,5%). El subtipo de psoriasis más prevalente fue la vulgaris (62,5%). El nivel sérico de vitamina D más bajo fue de 15,2 ng/mL, el más alto de 42,3 ng/mL y la media de 25,99 ng/mL. En el grupo de edad predominante entre 20-40 años, la proporción de pacientes con vitamina D inferior a 30 ng/mL es del 83,33%. Cuanto menor es el fototipo, mayor es la proporción de pacientes con vitamina D sérica inferior a la ideal. En el grupo de pacientes con duración de la enfermedad > 10 años, los niveles de vitamina D fueron inferiores. No hubo diferencias extremas en la eficacia de los tratamientos cuando se analizaron los niveles séricos medios, mínimos y máximos de vitamina D. **Conclusión:** No se observó ninguna relación entre los niveles séricos de 25-hidroxivitamina D (25OHD) y el desarrollo de psoriasis o incluso el pronóstico de la enfermedad.

Palabras clave: Psoriasis; Vitamina D; Sistema inmunológico.

1. Introduction

Psoriasis is a disease resulting from a keratinocyte proliferative disorder, in which progenitor cells located in the basal layer of the skin proliferate and differentiate after several cell cycles; it can be manifested both early and late (Da Silva et al., 2016). It consists of an autoimmune-mediated disease, which is influenced by genetics, emotions and the environment; It affects between 1 and 3% of the population, of both sexes, mainly in the age group of 10 to 45 years (Machado et al., 2019). It can occur concomitantly with other diseases, such as metabolic syndrome and other autoimmune diseases (Machado et al., 2019). It is characterized by thick red patches that peel and the most affected areas are mainly elbows, knees, scalp, hands, feet, nails and torso (Machado et al., 2019).

Vitamin D (cholecalciferol) is a fat-soluble vitamin synthesized in the skin through the photochemical conversion of 7-dehydrocholesterol, provided by the energy of short waves of ultraviolet radiation (Vidal, 2019). Vitamin D deficiency has been related to several dermatological diseases such as neoplasms, autoimmune dermatoses, photodermatoses, atopic dermatitis and psoriasis (Vidal, 2019).

In recent decades, the presence of vitamin D receptors (VDR) has been demonstrated not only in classic target tissues (bone, kidney, intestine), but also in other tissues, such as the immune system (T and B lymphocytes, macrophages, monocytes) and skin (Vidal, 2019). Evidence indicates that, compared to healthy individuals, patients with psoriasis have lower levels of vitamin D (Vidal, 2019). One of the hypotheses for this fact is that psoriatic patients do not expose themselves to the sun daily, when there is a greater synthesis of 25-hydroxyvitamin D (25OHD), but rather that they expose themselves for longer, but less frequently, not resulting, therefore, in the effective synthesis of vitamin D (Vidal, 2019).

The topic of vitamin D and its relationship with psoriasis and its severity has been discussed a lot in the scientific literature and is a subject that differs opinions. Investigate whether there is any association between the levels of vitamin D in the blood and the seriousness of psoriasis or its development.

2. Methodology

The present study is characterized as empirical, observational and retrospective in nature, with form completion through analysis of medical records and laboratory tests, covering a period of one year (Estrela, 2018).

Patients who were diagnosed with psoriasis in a dermatology outpatient clinic, in the city of Passo Fundo/RS, from August 2019 to June 2021 participated in this study. The sample was composed of forty patients who presented psoriasis of any subtype, serum dosage of vitamin D, female or male, over eighteen years of age, residents of Passo Fundo or neighboring cities.

For the sample calculation, the Epi-info software was used, a significance level of 95%, statistical power of 80%, considering 60% of those exposed positive (improvement after treatment - proportion yes or no), and 6% risk. The result obtained was 40 patients. Patients who did not have complete medical records with the necessary data to carry out the research were excluded from this study.

To construct this study, data obtained from each patient's medical records was used, using a form prepared by the authors themselves, which contains information such as sex, age, phototype, level of education, family history of psoriasis, duration of psoriasis, subtype of psoriasis, psoriasis, treatment carried out for psoriasis and result of laboratory test with dosage of 25OH- Vitamin D.

Statistical methods: in this study descriptive statistics were performed, obtaining the absolute and relative frequencies of each variable. Furthermore, the main variables were crossed in order to obtain a better view of each group; this profile was built based on the analysis of bar graphs, pie charts and histograms, and the calculation of some measures (such as proportions, averages, minimums and maximums). To implement these techniques, the R software, version 4.0.0, was used.

The project was approved by the Research Ethics Committee of Faculdade ATITUS EDUCAÇÃO (ATITUS) by opinion number 4.817.110 and holds the Certificate of Presentation for Ethical Assessment (CAAE) protocol number 44639520.1.0000.5319, following resolution 466/2012, as well as the principles of the Research Ethics Committee.

3. Results

3.1 Population characteristics

The study population consisted of 40 patients (n=40), including 40% men (n=16) and 60% women (n=24). Of the total, 2.5% were <20 years old, 45% between 20-40 years old, 37.5% between 41-60 years old and 15% over 60 years old. There were few people in the extreme groups, mainly in the group under 20; the vast majority of participants were between 20 and 60 years old.

The answers regarding skin phototype showed that 37.5% (n=15) of the interviewees classified as phototype II (light skin), 37.5% (n=15) phototype III (light skin that tans moderately), 22.5% (n=9) phototype IV (light brown skin) and 2.5% (n=1) phototype V (dark brown skin). Phototypes II and III were the most frequent, phototype IV had slightly fewer participants; the proportion of participants with phototype V is very low and phototypes I (very light skin) and VI (dark skin) had no representatives in the sample.

3.2 Past medical history

In relation to education, it was found that 2.5% (n=1) of individuals did not attend school, 27.5% (n=11) studied up to primary school, 5% (n=2) had secondary education incomplete high school, 35% (n=14) completed high school and 30% (n=12) completed higher education.

Regarding family history of psoriasis, 50% (n=20) had no illness history and 50% (n=20) had a history of the disease.

3.3 Duration of illness

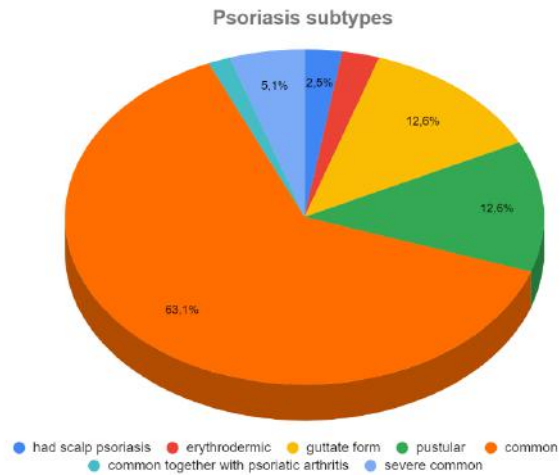
Regarding the duration of the disease, 7.5% (n= 3) had it for <1 year, 57.5% (n= 23) had it between 1-10 years and 35% (n=14) had it for >10 years. Few observations lasting less than 1 year.

3.4 Subtypes

When analyzing the subtypes, 2.5% (n=1) had scalp psoriasis, 2.5% (n=1) erythrodermic, 12.5% (n=5) guttate form, 12.5% (n=5) pustular, 62.5% (n=25) common, 1.5% (n=1) common together with psoriatic arthritis and 5% (n=2) severe

common. Psoriasis vulgaris is the most common, followed by pustular and guttate subtypes. The subtypes and their respective prevalence rates are shown in Figure 1.

Figure 1 – Psoriasis subtypes and their prevalence.

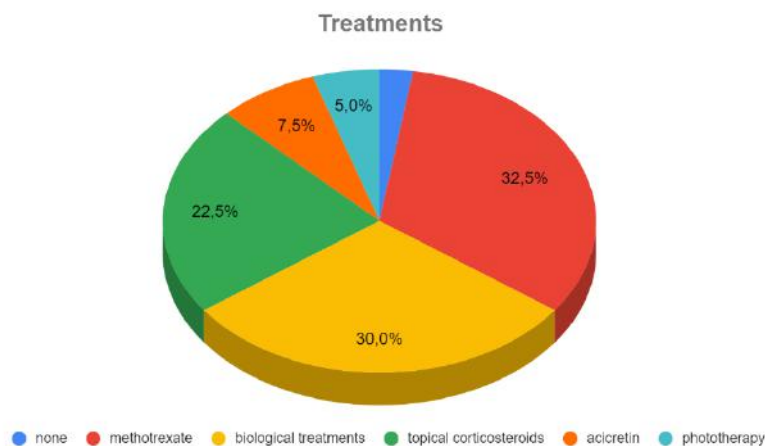


Source: Authors (2021).

3.5 Treatments

In relation to treatment, 2.5% (n=1) did not undergo any type of treatment, 32.5% (n=13) used methotrexate, 30% (n=12) biological, 22.5% (n=9) topical corticosteroids, 7.5% (n=3) acicretin and 5% (n=2) phototherapy. The most used treatments were methotrexate and biological treatments, followed by topical corticosteroids. The list of treatments and their respective prevalence rates are shown in Figure 2.

Figure 2 - Treatments and their prevalence.



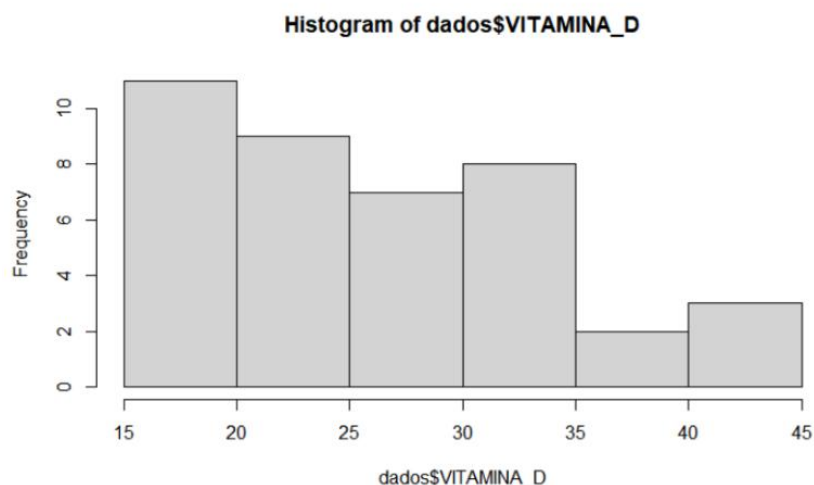
Source: Authors (2021).

3.6 Vitamin D

In relation to serum vitamin D, the lowest level found was 15.2 ng/mL, while the highest was 42.3 ng/mL. The

average value was 25.99 ng/mL. 27.5% of patients had levels below 20 ng/mL (Figure 3).

Figure 3 – Histogram vitamin D: levels and frequencies.



Source: Authors (2021).

3.7 Cross-analyses

In the age group between 20-40 years, the proportion of patients with serum vitamin D levels below 30 ng/mL is 83.33%; in the age group between 41-60 years the proportion is 53.33%. In the age group between 20-40 years, the proportion of patients with serum vitamin D levels equal to or greater than 30 ng/mL is 16.67%; in the age group between 41-60 years the proportion is 46.67% (Table 1).

Table 1 – Age x Vitamina D.

AGE	VITAMIN D <30	VITAMIN D >30
20-40 YEARS OLD	83,33	16,67
41-60 YEARS OLD	53,33	46,67

Source: Authors (2021).

In patients with higher vitamin D levels, the proportion of phototype groups IV and V is higher; while in people with a lower vitamin D index, the proportion of people with phototype II is higher.

As the vitamin D level increases, the proportion of phototype II will decrease and the proportion of phototype IV and V will increase. In other words, apparently, among the survey patients, the lower the phototype, the lower the vitamin D levels (Table 2).

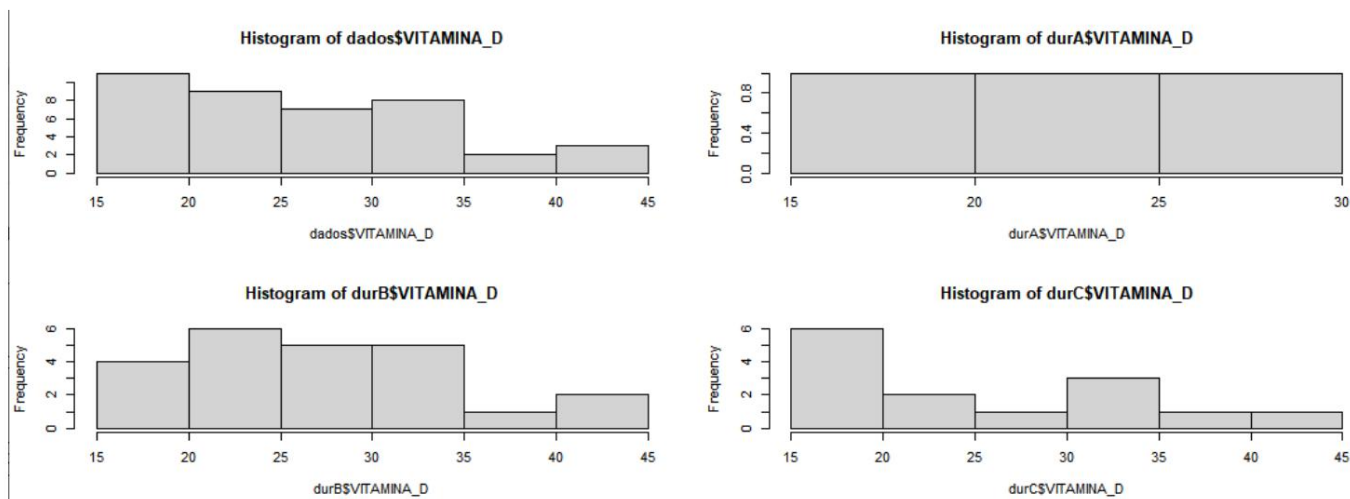
Table 2 – Vitamin D x Phototype.

PHOTOTYPE	I	II	III	IV	V	VI
COMPLETE DATABASE	0,0	37,5	37,5	22,5	2,50	0,0
VITAMIN D <20	0,0	54,55	36,36	9,09	0,0	0,0
VITAMIN D BETWEEN 20 AND 30	0,0	37,5	43,75	18,75	0,0	0,0
VITAMIN D > 30	0,0	23,08	30,77	38,46	7,69	0,0

Source: Authors (2021).

In the group of people with duration >10 years, vitamin D levels are lower, even when compared to the other groups (Figure 4).

Figure 4 — Duration x Vitamin D.



Source: Authors (2021).

The minimum value of the guttate subtype is higher than the minimum of the other subtypes; while its maximum value is lower than the others. In other words, patients with the guttate subtype generally have lower levels of vitamin D. The vulgaris and severe vulgaris subtype have the highest serum levels of vitamin D. Furthermore, the average serum vitamin D value in patients with the vulgaris subtype is higher than that of the other subtypes (Table 3).

Table 3 — Subtype x Vitamina D.

VITAMIN D	AVERAGE VALUE	MINIMUM VALUE	MAXIMUM VALUE
COMPLETE DATABASE	25,99	15,2	42,3
GUTTATE	22,8	20,3	26
PUSTULAR	24,76	16,7	34,2
VULGARIS	26,3	15,2	42,3
SEVERE VULGARIS	32,6	29	36,2

Source: Authors (2021).

The vulgaris subtype apparently does not depend on the vitamin D index, as its proportion is lower in the group with vitamin D between 20 ng/mL and 30 ng/mL than in the other groups. A similar conclusion can be reached when looking at the guttate subtype, since all of its occurrences occurred in patients with vitamin D between 20 ng/mL and 30 ng/mL. It is also worth noting that, in patients with vitamin D above 30 ng/mL, only the vulgar, severe vulgaris and pustular subtypes appeared (Table 4).

Table 4 — Vitamin D x Subtype.

SUBTYPE	HAD SCALP	ERYTHRODERMIC	GUTTATE FORM	PUSTULAR	COMMON	COMMON TOGETHER WITH PSORIATIC ARTHRITIS	SEVERE COMMON
COMPLETE DATABASE	2,5	2,5	12,5	12,5	62,5	2,5	5,0
VITAMIN D <20	0,0	0,0	0,0	18,18	81,82	0,0	0,0
VITAMIN D BETWEEN 20 AND 30	6,25	6,25	31,25	6,25	37,5	6,25	6,25
VITAMIN D > 30	0,0	0,0	0,0	15,39	76,92	0,0	7,69

Source: Authors (2021).

Among patients with a serum vitamin D level lower than 30 ng/mL, the use of biologics is the most common; while among patients with serum vitamin D levels equal to or greater than 30 ng/mL, the use of topical corticosteroids is the most common (Table 5).

Table 5 — Treatment x Vitamin D.

	VITAMIN D <30	VITAMIN D ≥ 30
BIOLOGICS	83,33	16,67
TOPICAL CORTICOSTEROIDS	55,56	44,44
METHOTREXATE	69,23	30,77

Source: Authors (2021).

4. Discussion

According to data provided by the Brazilian Society of Dermatology (SBD), research carried out in 2017 showed that, in Brazil, psoriasis affects 1,31% of people and that the regions with the highest prevalence are the South (1.86%) and the Southeast (1.88%), probably due to the lower incidence and also because of the greater European ancestry in these places (Turbiani, 2019). Regarding color, in the present study, represented by the classification of phototypes, there was a predominance of phototypes II (37,5%) and III (37,5%).

There was a difference in the average 25(OH)D between the different phototypes, in which the lower the phototype, the greater the proportion of people with a lower vitamin D index. In the literature there is a higher prevalence of vitamin D deficiency and lower levels of vitamin D deficiency in black people, especially those who live in temperate zones, where there are periods of the year with low solar radiation (Alzaman et al., 2016; Dawson-Hughes, 2004; Hagenau et al., 2009).

Considering only patients with psoriasis, women received lower levels of vitamin D than men. This same finding was reported by some authors in their studies (Zuchi et al., 2015). Although the literature does not indicate a difference in 25(OH)D levels considering age and sex in the general population, we possibly found this difference in the population because men with psoriasis exposed themselves to the sun much more intensely (Hilger et al., 2014).

Recent studies report clinical improvement in psoriasis after sun exposure, which may be caused by a decrease in cutaneous lymphocyte-associated antigen (CLA) and T10 cells (Pitukweerakul et al., 2019). This clinical improvement is possibly due to the increased production of vitamin D in the skin after sun exposure¹⁰. Some studies have identified an association between vitamin D receptor (VDR) polymorphisms and the severity of psoriasis, believing that it affects alteration in the skin barrier (Pitukweerakul et al., 2019).

Several non-pharmacological treatments help to prevent or alleviate psoriasis (Moscardi et al., 2017). These include a healthy diet rich in fruits and vegetables, low alcohol consumption, maintaining an ideal weight, maintaining sleep, the use of emollient moisturizers with high skin penetration capacity and sunbathing at appropriate times (from 9 am to 11:30 am and from 4 pm until the end of the day) (Moscardi et al., 2017).

Authors who sought to evaluate the association between vitamin D deficiency and the seriousness of psoriasis, taking

into account the average serum levels, also found no association between them (Atwa et al., 2013; Gupta et al., 2016; Morimoto et al., 1990). However, in the literature, there are discordant results, which demonstrate there is an inverse correlation between serum 25(OH)D levels and the severity of the disease (Chandrashekar et al., 2015; Gisondi et al., 2015).

Several case-control studies have shown significantly lower serum 25(OH)D levels in psoriasis patients compared to control sheets and reported an inverse correlation between serum 25(OH)D levels and disease severity (Umar et al., 2018). There is evidence indicating that vitamin D can improve the inflammatory symptoms of psoriasis by stimulating the production of molecules that block the formation of inflammatory complexes in the skin, but there is controversy and opinions are divided among experts (Vidal, 2019).

The real role of vitamin D in the pathogenesis and severity of psoriasis has not yet been established (Soleymani et al., 2015). The different results found in the literature show this is still a controversial subject (Delvin et al., 2014). There are no well-established recommendations regarding optimal levels of 25(OH)D for these patients, or even supplementation protocols that go beyond what is already established for the homeostasis of bone metabolism (Delvin et al., 2014).

The sample of this study was selected randomly, which may, consequently, have selected patients with greater lesions caused by the disease and also those who live with it for a longer time and who, consequently, are those who most seek medical support, since 57, 5% of patients had lesions between 1-10 years and 35% >10 years. Furthermore, there was no significant association between serum levels of 25(OH)D and the severity of psoriasis, as suboptimal serum levels (30 ng/mL) were recorded both in patients with milder forms, as well as with more severe forms. severity of the disease; in contrast, serum levels above the ideal level (30 ng/mL) were also recorded in patients with mild and severe forms of the disease, such as the vulgar subtype (76.92%) and severe vulgaris (7.69 %).

5. Conclusion

The role of vitamin D and its relation to psoriasis and its seriousness is still controversial, in the current study there wasn't any significant correlation. However, as it is an observational study, it is not possible to set a relation of cause and effect between the disease and its seriousness and low levels or higher prevalence of deficiency/insufficiency of serum 25(OH)D levels.

Thus, additional studies are necessary to set recommendations for both reference values and replacement doses for patients with the disease, in the same way as is determined for bone metabolism. The authors also suggest that further studies be carried out on the subject, looking more closely at the correlations between vitamin D and other substances and psoriasis, in order to observe their effects on the development and severity of the disease.

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