

Nutritional supplementation effect ON THE nail PLATE'S strength and growing

Efeito de suplementação nutricional no fortalecimento e crescimento das lâminas ungueais

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RESUMO

Introdução: "unhas quebradiças", ou que não crescem, constituem queixa relativamente frequente na prática dermatológica; entretanto, há poucos estudos sobre a influência nutricional nessa queixa

Objetivo: avaliar a possível influência de suplemento nutricional na melhora da resistência da lâmina ungueal, bem como de seu crescimento

Material e Métodos: 45 pacientes com queixas de unhas frágeis/quebradiças foram observadas durante 16 semanas, sob uso de suplemento nutricional contendo vitaminas e oligoelementos em ingestão diária recomendada com avaliações clínicas e subjetivas em oito, 12 e 16 semanas.

Resultados: houve melhora nos parâmetros força, resistência, crescimento e integridade ungueais a partir de oito semanas, melhora que progride com o uso continuado do suplemento, permitindo afirmar que esse tratamento levou a perceptível melhora da qualidade da lâmina ungueal.

Conclusões: O suplemento nutricional avaliado se mostrou seguro e eficaz na melhora de sinais de enfraquecimento ungueal, como perda da resistência e redução da velocidade de crescimento.

Palavras-chave: doenças da unha; nutrientes; queratinócitos

ABSTRACT

Introduction: Brittle nails or nails that do not grow are relatively frequent complaints in the dermatological practice, nonetheless there are few studies on how nutrition influences these symptoms.

Objective: To evaluate the possible influence of nutritional supplementation for improving the nail plate's resistance and growth.

Methods: Forty-five patients complaining of fragile/brittle nails were observed for 16 weeks under recommended daily intake of a nutritional supplement containing vitamins and trace elements, having undergone clinical and subjective evaluations in Weeks 8, 12 and 16.

Results: There were improvements in the parameters strength, resistance, growth and nail integrity from Week 8, with further progress after continued use of the supplement, allowing the conclusion that this treatment led to noticeable improvement of the nail plate's quality.

Conclusions: The nutritional supplement evaluated was safe and effective in improving the signs of nail weakening, including loss of resistance and reduction of growth rate.

Keywords: nail diseases; nutrients; keratinocytes

Original Articles

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INTRODUCTION

The formation of the nail plate begins in the matrix, where keratinocytes multiply, differentiate and keratinize, in a process similar to that of hairs. The generated keratin stabilizes in a different pattern – disulfide bridges – that determines this adnexum's structural differences.

Its growth rate is of 2mm–3mm per month, leading to a total renovation of the exposed plate in 6–9 months, being slightly slower in the toes' nails.¹

Although the fingers' movement and the physical friction of the nails are important factors that contribute for their growth by stimulating the plate's synthesis, systemic factors that alter the vascularization and nutrition of the unguis apparatus also influence the keratinogenesis' speed and, therefore, of the growth and quality of the nails formed.²

In this manner, nails are influenced by the individual's nutritional state, which have diverse manifestations. When there is deficiency of zinc, for instance, onycholysis and onychodystrophy are described.² The brittle nail syndrome affects roughly 20% of the adult population, being characterized by onychoscysia and onychorrhexis.³ Although multiple factors have been investigated, there is clinical evidence that might be related to specific nutritional deficiencies.

Onychoses account for 10% of all dermatological complaints.⁴ Nails that are brittle or do not grow are relatively frequent complaints in the dermatological practice, especially in women and on fingernails, even in the absence of some related dermatosis or onychosis. However, there are few studies in the world medical literature relating onychoses to nutritional alterations.

OBJECTIVE

The objective of the present study was to evaluate the possible influence of a nutritional supplement known as Eximia Fortalize® in improving the nail plate's resistance and growth, through a clinical and subjective evaluation.

ETHICAL ASPECTS

This study was conducted with the approval of the Research Ethics Committee. All invited patients received a detailed explanation of the study and signed a REC approved Free and Informed Term of Consent.

MATERIAL AND METHODS

A prospective clinical, monocentric, open study was carried out with 68 female patients (between 18 and 60 years old) who complained of weakness and brittleness in the fingernails. The exclusion criteria were pregnancy, lactation and use of hormonal drugs, as well as the presence of onychoses. All patients underwent dermatological examination for the clinical observation of the complaint.

After the data were collected, patients were instructed to take one tablet (orally) daily for 16 consecutive weeks. The evaluated product's composition is in Chart 1.

The patients were instructed to return to the institute

for new evaluations after 8, 12 and 16 weeks. On these visits, the patients evaluated the nails' properties indicative of strength (thicker, harder, less brittle) and resistance (greater resistance to trauma and cut) by means of a questionnaire based on a five-rating system. An additional three-rating based questionnaire was applied for evaluating the perception of growth the nails. The clinical evaluations performed by dermatologist physicians assessed the nails' resistance (observation of onychoscysia and onychorrhexis signs) and integrity (morphological alterations such as onycholysis and onychomalacia).

Statistical evaluation

The percentage frequencies of the following variables were computed aimed at assessing the subjective effectiveness, according to the patient's satisfaction on each evaluation date: nail's *strength*, *resistance* and *growth*. The non-parametric Cochran's Q test was used (with a level of significance of 0.05) in order to test whether there was variation over time (from V0 to V4).

The same evaluations were performed for the nail plate's resistance and integrity, with the data collected in the clinical assessments (on the same experimental timepoints).

RESULTS

Of the 68 patients recruited, only 45 were included in the study due to absence of compliance with the inclusion and / or exclusion criteria. In the course of the study, one patient discontinued the use of the product for reasons unrelated to the study. Forty-four patients completed the research's protocol.

EFFECTIVENESS

Subjective evaluation

1. Stronger nails

According to Graph 1, the perception of improvement for the parameter *strength* increased gradually, with 61.4% of patients considering their nails strong from Week 8, 70.5% from

CHART 1: Nutritional supplement composition

COMPONENT	DOSE
Calcium pantetonate (Vitamin B5)	5mg
Magnesium	130mg
Ascorbic acid (Vitamin C)	45mg
Ferrous fumarate (Iron)	7mg
Tocopherol (Vitamin E)	10mg
Nicotinamide (Vitamin B3)	16mg
Zinc (Zinc oxide)	3,5mg
Betacarotene (Vitamin A)	600mcg
Cyanocobalamin (Vitamin B12)	2,4mcg
Thiamin (Vitamin B1)	1,2mg
Pyridoxine hydrochloride (Vitamin B6)	1,3mg
Riboflavin (Vitamin B2)	1,3mg
Folic acid	240mcg
Biotin	30mcg

Week 12, and 75% from Week 16. When compared to the perception at the beginning of the treatment, it was possible to observe that there had been a significant increase in the perception of very strong nails after Week 16 ($p < 0.023$) and strong nails after Week 8 ($p < 0.01$).

2. More resistant nails

At the initial visit, most patients (70.5%) considered their nails brittle. After eight weeks of treatment there was a significant reduction of this perception ($p < 0.001$). In addition, 68.2% and 65.9% of patients considered their nails more resistant after Week 12 and Week 16 of use of the product, respectively, as shown in Graph 2.

3. Nail growth

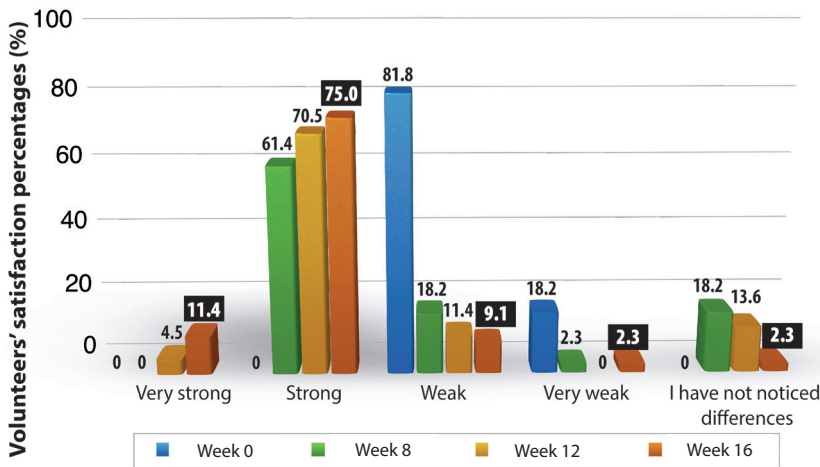
There was a significant increase in the perception of the nail's growth over time from Week 8. Of the 50% patients who perceived slow growth at baseline, only 6.8% remained with the

same opinion in Week 8 ($p = 0.001$). The perception of greater growth was already significant after Week 8, with 20% of the patients referring this increase, as shown in Graph 3.

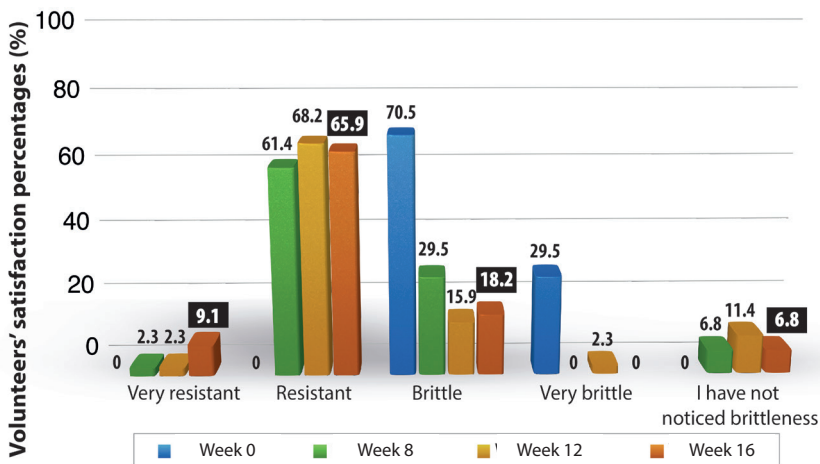
Clinical evaluation

1. Nail resistance

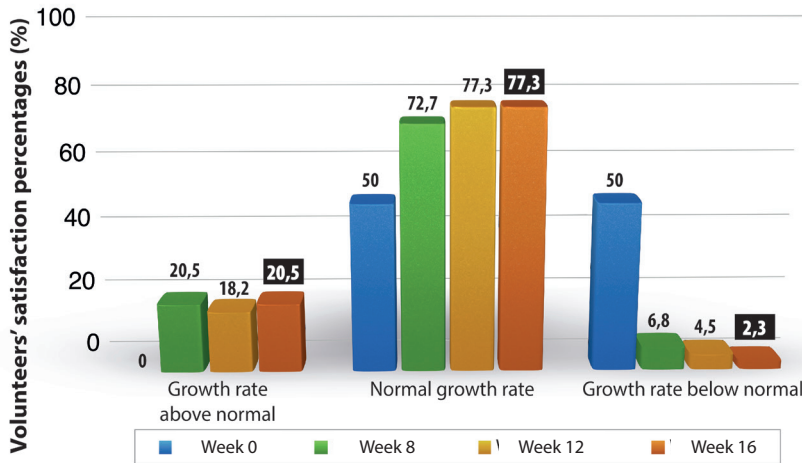
Graph 4 shows the percentage of ratings obtained for the clinical evaluation of the nails' resistance on the study's experimental timepoints. Graph 4 depicts the progressive clinical improvement of resistance over time, indicating a statistically significant increase in the resistance to trauma and cut: 47.7% in Week 8, 59.1% in Week 12, and 93.2% in Week 16 ($p < 0.001$). Weak / very weak nails, which accounted for 88.7% of the sample, decreased to 52.3% in Week 8, to 40.9% in Week 12, and to 6.8% in Week 16, confirming the presence of progressive and significant clinical improvement over time ($p < 0.001$).



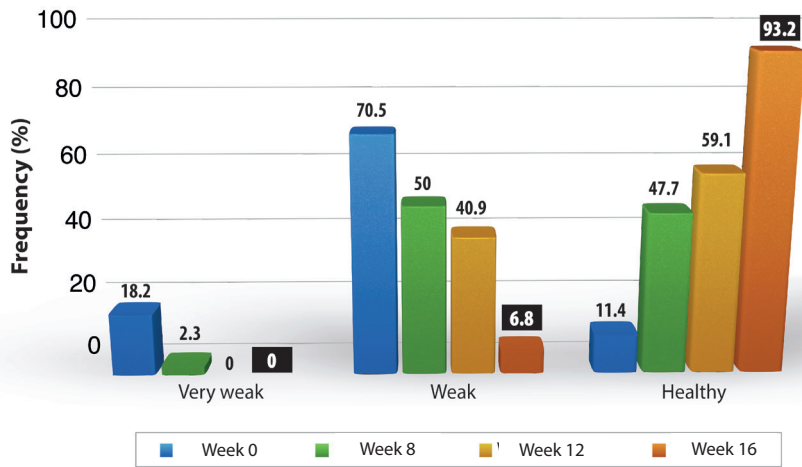
GRAPH 1: Percentages for the ratings attributed in the experimental timepoints (Weeks 0, 8, 12 and 16) in the subjective evaluation of perception of the nails' strength (n = 44)



GRAPH 2: Percentages for the ratings attributed in the experimental timepoints (Weeks 0, 8, 12 and 16) in the subjective evaluation of perception of the nails' resistance (n = 44)



GRAPH 3: Satisfaction percentages of the volunteers at the moments 0, 8, 12 and 16 weeks in the subjective evaluation for the perception of growth of the stronger nails (n = 44)



GRAPH 4: Percentages for the ratings attributed for the nails' resistance in the clinical evaluation in the experimental timepoints (Weeks 0, 8, 12 and 16) (n = 44)

2.Nail integrity

Clinical improvement of nail integrity, characterized by lower incidence and extent of onycholysis, was progressive over time and statistically significant: 72.2% of patients had brittle / very brittle nails at baseline, with 47.7 % in Week 8, 36.4% in Week 12 and 25.7% in Week 16 (p <0.001). Seventy-nine point five percent had healthy nails after 16 weeks of treatment, as shown in Graph 5.

Tolerability

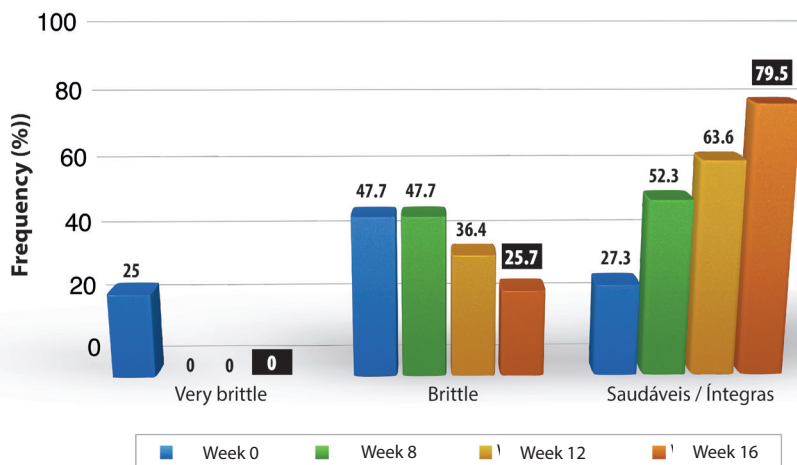
The use of the product in the recommended dosage (one tablet a day) was very well tolerated. None of the patients reported any discomfort during ingestion or adverse reaction of any nature during the study period.

DISCUSSION

The semiology of unguinal alterations is subtle, and some signs may coexist on the same nail plate, as in the case of osteomalacia (reduction of the nail's resistance) and onychoschisis (cracking of the free border). Some of these findings are related to traumatic causes (both mechanical and chemical), such as onycholysis and onychorrhexis.¹

However, onychoses have greater incidence in nails whose keratinogenesis is compromised, with one of the most common causes being linked to nutrition.⁵

Even if borderline, specific deficiencies of micronutrient and trace elements can lead to disorders in the formation of hair and nails, reflecting the adnexa's quality and growth rate.⁶ A good example is iron deficiency anemia, which classically leads to koilonychia; nevertheless, alterations in the nail's integrity can be noticed in mild deficiencies.¹



GRAPH 5: Percentages for the ratings attributed for the nails' integrity in the clinical evaluation in the experimental timepoints (Weeks 0, 8, 12 and 16) (n = 44)

There is evidence that the brittle nail syndrome, characterized by onychoschizia and onychorrhexis, is linked to deficiency of biotin.⁷

Oral carotenoids allow more effective concentration in regions with adnexa than their topical form, and are capable of normalizing the differentiation of keratinocytes, improving their metabolism and division, in addition to influencing the secretion of growth and transcription factors.⁸

The literature is however scarce when it comes to studies on nutritional deficiency involving nails. It makes sense to hypothesize that nutritional deficiencies responsible for alterations found in the hair also lead to problems in the nails given the similarity between these adnexa regarding the synthesis of keratin.⁹

The evaluated association of nutrients initially underwent a study in keratinocytes culture that demonstrated a significant increase in cell differentiation, with consequent greater

keratinogenesis.¹⁰ In the present study, the it was possible to observe a significant improvement in most of the parameters evaluated from Week 8 of use, and that the improvement increases with continued use. Although the nails' metric evaluation was not performed, the alignment of the clinical results with the data collected from the patients shows that the studied supplement led to a perceptible improvement in the quality of the nail plate.

CONCLUSION

The nutritional supplement evaluated was proven effective in improving the signs of unguis weakening (for instance, loss of resistance and decrease in the growth rate). The improvement in the quality of the nail plate was significant both in the clinical examination and in the patients' self-evaluation, demonstrating the nutritional supplement is safe in the approach of complaints involving weakness, brittleness, and low growth rates of the nails. ●

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