

Beyond straight nail cutting: a critical review of nail management and its relationship with biomechanical factors

Más allá del corte recto: revisión crítica del manejo ungueal y su relación con factores biomecánicos

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ABSTRACT

The recommendation to trim nails "straight across" has been widely promoted as a preventive strategy for ingrown toenails. However, this recommendation is based primarily on clinical consensus and tradition, without robust experimental evidence to validate its universal application (5,9). Given the multifactorial nature of this condition, which involves anatomical, biomechanical, and behavioral factors (1), it is necessary to critically review this paradigm.

Keywords: Onychocryptosis; Ingrown toenail; Nail trimming; Biomechanics; Foot deformities; Preventive care.

RESUMEN

La recomendación del "corte recto" ungueal ha sido ampliamente difundida como estrategia preventiva de la onicocriptosis. Sin embargo, su fundamento se basa principalmente en consenso clínico y tradición, sin evidencia experimental robusta que valide su aplicación universal (5,9). Dado el carácter multifactorial de esta patología, que involucra factores anatómicos, biomecánicos y conductuales (1), resulta necesario revisar críticamente este paradigma.

Palabras clave: Onicocriptosis; Uña encarnada; Corte de uñas; Biomecánica; Deformidades del pie; Cuidado preventivo.

Introduction

Onychocryptosis is among the most common nail conditions encountered in podiatric, dermatological, and primary care practices, causing pain, inflammation, functional limitations, and, in many cases, recurrences that significantly affect patients' quality of life. It is also a common reason for seeking medical care and frequent drainage of healthcare resources, particularly among young and active populations (2).

In this context, the so-called “straight nail cut” has been widely promoted as a first-line preventive strategy. This recommendation has transcended the clinical setting to become a widely accepted and socially transmitted standard of self-care. However, its widespread adoption stems more from the simplification of clinical criteria and professional tradition than from the existence of robust experimental evidence supporting its universal application (5-9).

The available scientific literature recognizes improper nail trimming as a significant risk factor for the development of onychocryptosis, particularly in relation to the formation of splinters that injure the periungual tissue (2). However, these descriptions are based predominantly on descriptive clinical approaches, without a precise definition of the technical parameters of the trim or its interaction with individual patient variables.

Moreover, there is a growing consensus regarding the multifactorial nature of this condition, which involves anatomical, biomechanical, and behavioral factors (1). Various studies have demonstrated an association between onychocryptosis and forefoot alignment abnormalities, deformities such as hallux valgus, and changes in load distribution (6,7,8). However, these variables are rarely systematically incorporated into recommendations for nail management.

This discrepancy suggests that conceptualizing the “straight cut” as a universal indication is insufficient to address a complex clinical condition that depends on the individual's biomechanical context. In this sense, nail trimming should not be understood solely as a geometric configuration but as an intervention that modifies the mechanical interaction between the nail plate and the periungual tissue.

In this context, the present study aims to critically analyze the available evidence on nail trimming in the prevention of onychocryptosis and to propose a conceptual approach based on the integration of individual biomechanical factors.



Figure 1—Intrinsic factors influencing the nail trimming technique.

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Materials and Methods

Study Design

A critical narrative review of the literature was conducted with the aim of analyzing the approach to nail trimming in relation to the prevention of ingrown nails and integrating the available evidence into a decision-making model based on individual biomechanical factors.

Search Strategy

A literature search was conducted in international biomedical databases, including the following:

- PubMed/MEDLINE
- Scopus
- Google Scholar

The search was conducted without any initial date restrictions, prioritizing publications from the last 10–15 years to ensure that the evidence was up to date.

Combinations of English keywords were used, such as the following:

- “ingrown toenail”
- “onychocryptosis”
- “Nail trimming”
- “Nail cutting technique”
- “Biomechanics of the foot”
- “Hallux valgus and ingrown toenail”

These terms were combined using Boolean operators (AND, OR) to optimize the results.

Inclusion and exclusion criteria

Inclusion criteria

Original articles, reviews, and clinical reports

Publications in English and Spanish

Studies related to:

- the etiology of ingrown toenails
- biomechanical factors of the foot
- clinical or preventive management
- Relationship between nail trimming and pathology

Exclusion criteria

Studies without access to the full text

Publications not related to the central theme

Articles with an exclusively surgical focus without etiological analysis

Study selection

The selection was conducted in three stages:

- Reading titles and abstracts, excluding those that are irrelevant
- Reading the full text of potentially relevant articles
- Final selection on the basis of thematic relevance and content quality

Data extraction and analysis

A qualitative analysis of the information was conducted, focusing on the following:

- Role of nail trimming as a risk factor
- Existing clinical recommendations
- Biomechanical factors associated with ingrown toenails
- Interaction between the nail plate and the periungual tissue

Since no studies have defined a nail-cutting technique on the basis of individual biomechanical variables, we proceeded to critically synthesize the available indirect evidence.

Summary of the evidence

The information collected was organized into the following thematic categories:

- Approaches to nail trimming in the literature
- Multifactorial etiology
- Biomechanical factors
- Nail–periungual tissue interaction

On the basis of this synthesis, a conceptual model was developed to guide clinical decision-making, integrating the identified factors.

Methodological considerations

As this is a narrative review, the present study does not follow a strict systematic protocol, nor does it include a meta-analysis. However, a structured approach was adopted in the search, selection, and analysis of information, with the aim of ensuring the consistency and relevance of the evidence used.

Results

The initial literature search identified a total of 85 potentially relevant publications in the databases consulted. After removing duplicates ($n = 15$), 70 records were evaluated by reviewing titles and abstracts.

Of these, 40 were excluded for failing to meet the inclusion criteria or for not being directly related to the study's objective. Consequently, 30 articles were selected for full-text reading.

Following a detailed evaluation, 12 studies were excluded for the following reasons: lack of thematic relevance ($n = 7$) and an exclusively surgical approach without etiological analysis ($n = 5$). Finally, 18 studies were included in the review.

The selected studies primarily addressed the following topics:

etiology of onychocryptosis

biomechanical factors of the foot

Clinical and preventive management

relationship between nail trimming and pathology (indirectly)

No studies have specifically evaluated nail trimming techniques in relation to individual biomechanical variables.

The search results reveal a lack of specific studies defining a nail-trimming technique on the basis of biomechanical variables, which reinforces the need for an integrative approach supported by the available indirect evidence.

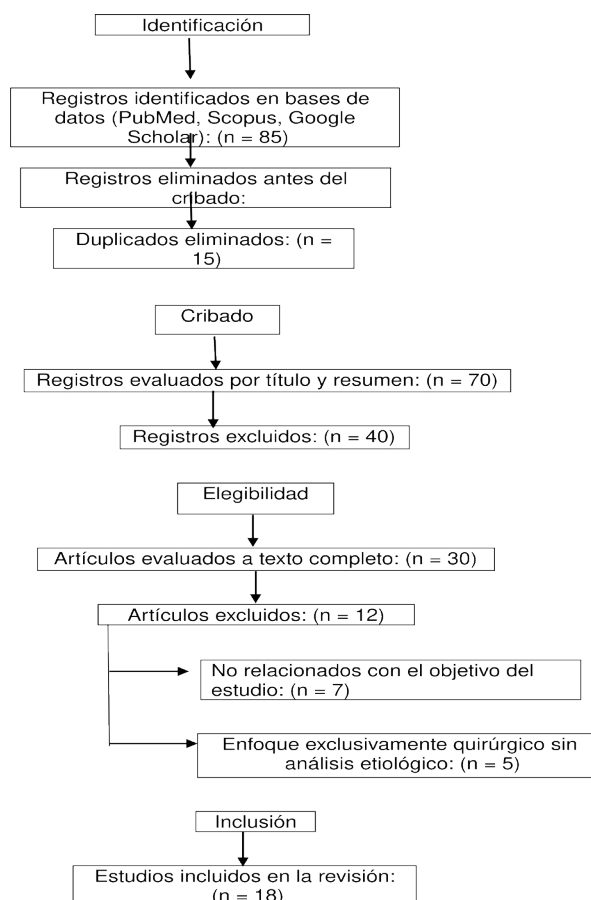


Figure 2 - Flowchart for study selection according to PRISMA 2020

TABLE 1. Characteristics of the studies included in the review

Author (ref)	Year	Study design	Population/sample	Main focus	Key findings
Heidelbaugh (1)	2009	Clinical review	Patients with onychocryptosis	Clinical management	Describes therapeutic options; mentions nail trimming as a factor, without detailing a specific technique
Siegle et al. (2)	2019	Review	Patients with ingrown toenails	Management and etiology	Identifies improper trimming as a common factor; descriptive clinical approach
Chabchoub and Litaïem (3)	2022	Narrative review	General population	Etiology and management	Considers nail trimming a risk factor, without technical analysis of the same
Baran and Haneke (4)	2018	Review	Dermatology patients	Etiology	Highlight the multifactorial nature of onychocryptosis
Rota et al. (5)	2021	Observational study	Patients with foot deformities	Biomechanics	Association between foot alignment and ingrown toenails
Kose et al. (6)	2011	Observational study	Patients with deformities	Biomechanics	Relationship between foot deformities and the development of ingrown toenails
Green and Kreuter (7)	2005	Book/theoretical model	Not applicable	Health behavior	Establishes the influence of behavioral factors on self-care practices
Conrad (8)	2007	Book/sociological analysis	Not applicable	Medicalization	Explains the transformation of everyday practices into medical norms
Sarı et al. (9)	2024	Observational study	Patients with foot deformities	Biomechanics	Strengthens the association between structural alterations and onychocryptosis

Discussion

The results of this review reveal a significant discrepancy between routine clinical practice and the available scientific evidence regarding nail trimming techniques for the prevention of ingrown toenails. Although the so-called “straight cut” is widely promoted as a standard recommendation, its rationale is based primarily on clinical consensus and tradition rather than on experimental studies that conclusively validate its efficacy (1,2).

In this context, the reviewed literature tends to emphasize the consequences of improper nail trimming—particularly the formation of splinters—as a trigger for periungual injury. However, no precise descriptions of the technical parameters that would define an optimal trimming technique were identified, nor were there analyses that incorporated individual patient variables. These findings highlight that current recommendations are geared more toward avoiding incorrect practices than toward establishing evidence-based technical criteria.

On the other hand, the results of the included studies support the multifactorial nature of onychocryptosis, highlighting the interactions among anatomical, biomechanical, and behavioral factors (4). In particular, various studies have demonstrated associations between the presence of foot deformities—such as hallux valgus—alterations in forefoot alignment and changes in load distribution and the development of this condition (5,6,9). However, these variables are rarely considered in traditional recommendations regarding nail trimming, which highlights a disconnect between etiological knowledge and preventive practices.

From this perspective, reducing nail trimming to a specific geometric shape is insufficient to address a clinical phenomenon that is inherently dynamic and dependent on the individual context. The nail is not an isolated structure but rather part of a functional system in which the nail plate (), periungual tissue, and external mechanical forces interact. Factors such as shoe pressure, gait, and foot morphology can alter the distribution of loads on the nail edge, influencing its behavior and its potential to cause injury.

Similarly, the analysis of nail trimming as a practice cannot be separated from its sociocultural dimension. As evidenced by health behavior models and medicalization processes, certain simplified clinical recommendations tend to spread as generalized self-care norms, regardless of their individual applicability (7,8). In this sense, the “straight cut” can be interpreted not only as a clinical indication but also as a cultural construct that has been adopted and uncritically reproduced by the general population.

Taken together, these findings suggest that the approach to nail trimming should be reconsidered from a more integrative perspective. Rather than being defined exclusively by its geometric configuration, the trim should be evaluated on the basis of its mechanical impact on the periungual environment, prioritizing the prevention of ingrown nails and adaptation to the patient's individual characteristics.

In this context, rather than proposing a decision-making algorithm—which would require the methodological support typical of systematic reviews or experimental studies—this study presents a conceptual framework based on the integration of available evidence. This approach suggests the need to consider, in clinical practice, variables such as hallux alignment, the presence of digital deformities, nail curvature, and the characteristics of the periungual tissue when the trimming technique is used.

From a clinical perspective, this approach allows for progress toward a more individualized care model, in which nail trimming ceases to be a standardized procedure and becomes a contextualized decision. This aligns with contemporary patient-centered approaches that prioritize adapting interventions to the specific characteristics of each case.

However, the present study has limitations inherent to its design. As a narrative review, it did not follow a systematic protocol, nor did it perform a meta-analysis, which may introduce biases in the selection and interpretation of the evidence. Similarly, the absence of specific studies evaluating the nail-cutting technique in relation to biomechanical variables limits the ability to establish recommendations on the basis of direct evidence, reinforcing the need for future research in this field.

In this regard, the development of studies integrating biomechanical and clinical analyses is considered a priority, with the aim of defining more precise technical criteria for managing nail trimming in different anatomical and functional contexts.

Conclusions

The available evidence does not support the existence of a universal nail-cutting technique applicable to all patients. The so-called “straight cut” primarily reflects a clinical and cultural simplification rather than a validated biomechanical principle.

Onychocryptosis should be understood as a multifactorial condition in which nail trimming constitutes only one of the factors involved within a dynamic system that integrates anatomical, biomechanical, and behavioral variables.

In this context, the impact of nail trimming does not depend exclusively on its geometric configuration but rather on its interaction with the patient's individual characteristics and with the mechanical forces acting on the nail apparatus.

Consequently, a shift in the approach to the preventive management of onychocryptosis is proposed, aimed at individualizing clinical practice and considering the mechanical effect of nail trimming on the periungual environment.

Finally, the need to conduct studies that specifically evaluate the relationship between the nail-cutting technique and biomechanical variables is emphasized, with the aim of establishing recommendations based on more robust evidence.

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CONFLICT OF INTEREST

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