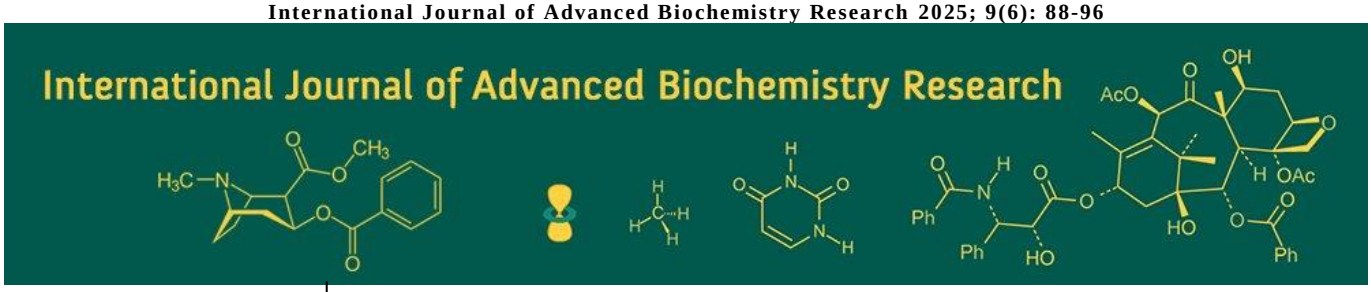


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**Rahul Sinha**
College of Pharmacy, Shivalik Campus, Sihniwala, Shimla bypass road, Dehradun, Uttarakhand, India

**Himanshi Rathaur**
College of Pharmacy, Shivalik Campus, Sihniwala, Shimla bypass road, Dehradun, Uttarakhand, India

**Sayantan Mukhopadhyay,**
College of Pharmacy, Shivalik Campus, Sihniwala, Shimla bypass road, Dehradun, Uttarakhand, India

**Corresponding Author:**
**Himanshi Rathaur**
College of Pharmacy, Shivalik Campus, Sihniwala, Shimla bypass road, Dehradun, Uttarakhand, India

# Onychomycosis focus in the elderly: Prevalence, diagnosis and treatment strategies

**Rahul Sinha, Himanshi Rathaur and Sayantan Mukhopadhyay**

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**Abstract**
Dermatophytes, yeasts, and non-dermatophyte molds are the main causes of onychomycosis, a common fungal infection that affects the fingernails and toenails. Its global prevalence ranges from 5% to 12%, and it accounts for up to 50% of all nail disorders. With greater prevalence's seen in men, older adults, and those with underlying medical conditions like diabetes or weakened immune systems. Advanced age, nail trauma, using public areas, and wearing occlusive footwear are risk factors. Even though onychomycosis rarely poses a threat to life, the pain, disfigurement, and psychological effects have a substantial negative influence on quality of life. Usually, a clinical examination and laboratory confirmation are used to make the diagnosis. Oral and topical antifungals are among the available treatment options; in cases that do not improve, laser and surgical procedures may be necessary. Avoiding shared footwear and practicing good hygiene are examples of preventive measures that are vital to lowering transmission. To address the growing worldwide burden of this condition and improve management strategies, more research is required.

**Keywords:** Fungal, dermatophytes, onychomycosis, laser

## Introduction
Both fingernails and toenails can be affected by onychomycosis, a common fungal infection of the nails, though toenails are more commonly affected. It affects roughly 10-20% of people worldwide and makes up about 50% of all nail disorders; its prevalence rises with age. The main culprits are non-dermatophyte molds (Scopulariopsis and Aspergillus species), yeasts (Candida species), and dermatophytes (most frequently *Trichophyton rubrum*) [1].
Clinical signs of onychomycosis include nail discoloration, thickening, fragility, and onycholysis, or separation from the nail bed. Although the condition is frequently thought of as a cosmetic one, it can cause pain, discomfort, and a lower quality of life.
Additionally, it puts people with underlying illnesses like diabetes, peripheral vascular disease, or immunosuppression at serious risk, where complications likeBacterial secondary infections may occur.
Despite being common, onychomycosis is still difficult to treat because of the slow nail growth and poor drug absorption. Systemic antifungal medications, topical therapies, and more recent techniques like laser treatments are available as treatment options; however, recurrence rates are still high in the absence of appropriate preventive measures [2].
Despite being common, onychomycosis is still difficult to treat because of the slow nail growth and poor drug absorption. Systemic antifungal medications, topical therapies, and more recent techniques like laser treatments are available as treatment options; however, recurrence rates are still high in the absence of appropriate preventive measures [2].

## Prevalence of Onychomycosis
Now a day, delivering of active ingredients with a level of comfort, presentation and bioavailability and these studies is infringement the difficulty of conventional method. Various factors are examined like choice of excipients, bioavailability, stability and cost effectiveness. In recent times, there was an interest for using the nail lacquer for impart drugs directly into the systemic circulation. Onychomycosis is a common concern of all age groups, especially or focus on elderly patients. It observes difficulties in the population to topically dosage forms and it don't improve the patient compliance.

Through nail drug impart within the blood stream and have rich blood supply, extreme permeability and improves the patient compliance [37].

Onychomycosis, a fungal infection of the nails, is a common condition worldwide. Its prevalence varies based on factors such as geography, age, underlying health conditions, and lifestyle. Here are key points about its prevalence. Around the world, onychomycosis, a fungal infection of the nails, is a prevalent ailment. Geographical location, age, underlying medical conditions, and lifestyle all affect its prevalence. Key details regarding its prevalence are as follows:

Onychomycosis is thought to affect 5-10% of people worldwide, though this varies depending on environmental, demographic, and geographic factors. Here is a thorough summary:

**Fig 1:** Patient with onychomycosis [3]

**Global Prevalence**

The global prevalence of onychomycosis is estimated to be around 5-10% of the general population, though this varies based on geographic, demographic, and environmental factors. Below is a detailed overview:

- **Worldwide Prevalence:** Between 5% and 12% of the global population is affected by onychomycosis [4].
- **Higher-Risk Groups:** In certain populations, prevalence rates are significantly higher:
- **Elderly adults:** Up to 20-30% or more in those over 60 years.
- **Diabetic individuals:** Up to **26%** may have onychomycosis.
- **Immuno compromised populations:** Prevalence can exceed 30% in some groups, such as organ transplant recipients or those with HIV [3, 4].

**Regional Prevalence**

- **North America:** Around 8-12% of the population is affected.
- **Europe:** Prevalence varies, with estimates ranging from 3% to 14%, higher in older adults and temperate regions.
- **Asia:** Rates range from 3% to 10%, though specific studies have shown localized variations based on climate and healthcare access.
- **Africa:** Prevalence data is limited but estimated to be lower in rural areas; urban areas with higher humidity may have rates closer to global averages.
- **Latin America:** Rates are estimated at around 10-15%, often linked to tropical climates and limited access to treatment [2].

**Contributing Factors**

- **Climate:** Warm and humid environments promote fungal growth, leading to higher rates in tropical and subtropical regions.
- **Socioeconomic Conditions:** Limited access to healthcare and communal living spaces can increase prevalence.
- **Cultural Practices:** Wearing occlusive footwear, walking barefoot in communal areas, and nail grooming habits influence rates [1].

**Trends over Time**

The prevalence of onychomycosis is increasing globally due to:

- Aging populations.
- Rising rates of diabetes and other chronic illnesses.
- Greater use of public gyms, swimming pools, and nail salons, which increase exposure to fungi [5].

**Age Related Prevalence in Onychomycosis**

The prevalence of onychomycosis is strongly associated with age, increasing significantly in older populations. Here's a breakdown of age-related prevalence:

**Children (<18 years)**

- Prevalence: 0.2-2%
- Onychomycosis is rare in children due to:
- Faster nail growth.
- Reduced exposure to fungal risk factors (e.g., communal showers or long-term closed footwear use).
- Fewer comorbidities such as diabetes or vascular issues [5, 6].

**Adults (18-60 years)**

- Prevalence: 3-8%
- Increases steadily with age due to:
- Occupational exposure. Increased participation in activities involving communal spaces (gyms, swimming pools).
- Traumas to the nails.
- Chronic conditions that compromise circulation or immunity [6].

**Older Adults (>60 years)**

- Prevalence: 20-30% or higher.
- The highest prevalence is observed in this group, primarily because of:
- Slower nail growth, which allows fungi to establish.
- Decreased immune function and circulation, especially in the extremities.
- Increased likelihood of comorbid conditions like diabetes and peripheral vascular disease.
- Long-term use of occlusive footwear [2].

**Why Does Prevalence Increase With Age?**

**Weakened Immune System**

Aging compromises the immune response to fungal infections.

**Slower Nail Growth**

Fungi have more time to proliferate before being "pushed out."

**Chronic Conditions**
Diseases like diabetes and vascular insufficiency predispose older adults to infections.

1. **Frequent Nail Trauma:** Nails in older individuals are more brittle and prone to damage, creating entry points for fungi [1].

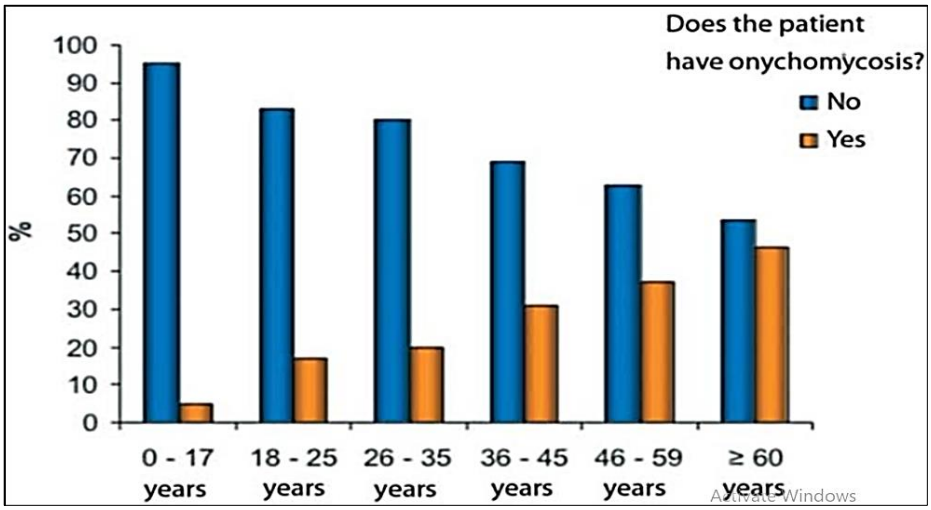


**Fig 2:** Prevalence of onychomycosis with age range [1]

**Gender Difference in Onychomycosis**
Gender differences in onychomycosis prevalence have been observed, with men generally being more affected than women. Here's a breakdown of these differences:

**General Trends**
**Men:** Onychomycosis is significantly more common in men.
- Studies estimate men are 1.5 to 3 times more likely to develop onychomycosis than women.
- Higher prevalence in men is consistent across age groups and geographic regions.

**Women:** Although less common, women are more likely to seek medical care for cosmetic concerns related to nails, leading to earlier diagnosis and treatment [7].

**Fig 3:** White superficial onychomycosis [1]

**Reasons for Gender Differences**
**Occupational and Lifestyle Factors**
- Men are more likely to engage in activities involving nail trauma (e.g., manual labor, sports) and exposure to fungi (e.g., communal showers, locker rooms).
- Women are more likely to take proactive nail care steps, including regular grooming and treatment [3].

**Footwear Habits**
- Men's footwear is often occlusive, providing a warm and moist environment conducive to fungal growth.
- Women's open-toed or ventilated shoes may reduce the risk of fungal proliferation [8].

**Hormonal and Physiological Differences**
- Hormonal factors in women, such as the antifungal properties of estrogen, may provide some protection.
- Men may have thicker nails, which are more prone to trauma and harder for topical antifungal treatments to penetrate [9].

**Healthcare-Seeking Behavior**
- Women are more likely to seek medical advice for nail disorders, leading to earlier treatment and lower prevalence.
- Men often delay seeking treatment, allowing infections to persist and worsen [10]

**Gender and Risk Groups**
- In older adults, the gender gap narrows because risk factors like aging, diabetes, and circulatory issues affect both genders.
- Postmenopausal women may experience increased prevalence due to decreased estrogen levels and slower nail growth [11].

**Regional Variations**
- **Temperate Climates:** Higher prevalence, often due to increased use of closed footwear and humid environments that favor fungal growth.
- **Tropical Climates:** High humidity may also contribute to increased rates, especially among those who walk barefoot [12].

**Diagnosis of Onychomycosis**
The diagnosis of onychomycosis requires a combination of clinical evaluation and laboratory confirmation to distinguish it from other nail disorders such as psoriasis, lichen planus, or trauma-induced changes. Accurate

diagnosis is essential to ensure appropriate treatment and avoid unnecessary antifungal therapy.

**Clinical Assessment**

Onychomycosis is suspected based on characteristic nail changes, including discoloration (yellow, white, or brown), thickening, brittleness, onycholysis (separation of the nail from the nail bed), and deformity. However, clinical features alone are not diagnostic, as they overlap with other nail diseases [3].

**Laboratory Methods**

- **Direct Microscopy:** Nail clippings or scrapings are treated with potassium hydroxide (KOH) to dissolve keratin, allowing visualization of fungal elements under a microscope. This is a rapid and cost-effective method but requires experienced personnel.
- **Fungal Culture:** Nail samples are cultured on Sabouraud's dextrose agar to identify the specific fungal species. While this method is highly specific, it is time-consuming and may yield false negatives due to the slow growth of fungi or contamination.
- **Histopathology:** Nail clippings stained with periodic acid-Schiff (PAS) or Gomori methenamine silver can demonstrate fungal hyphae within the nail. This method is particularly useful when culture results are negative [13].
- **Molecular Diagnostics:** Polymerase chain reaction (PCR) techniques offer high sensitivity and specificity by detecting fungal DNA. These methods are faster than cultures but may not be widely available due to cost constraints [14].

**Emerging Diagnostic Tools**

Advanced techniques such as dermoscopy, which highlights characteristic nail patterns, and confocal microscopy, allowing *in vivo* imaging of fungi, are gaining popularity in research and clinical settings.

**Differential Diagnosis**

Other conditions that mimic onychomycosis, such as nail psoriasis, lichen planus, or trauma, should be excluded through thorough clinical and diagnostic evaluations [15].

**Fig 4:** Onychomycosis in a patient with coexisting tinea pedis [14]

**Treatment of Onychomycosis**

The treatment of onychomycosis involves addressing the fungal infection effectively while minimizing recurrence. The therapeutic approach depends on the severity of the infection, the organism involved, and patient-specific factors such as comorbidities. Treatment modalities include systemic antifungal agents, topical therapies, combination treatments, and newer modalities like laser therapy [16].

**1. Systemic Antifungal Therapy**

**Terbinafine (First-line Therapy)**

- **Mechanism:** Inhibits fungal squalene epoxidase, disrupting ergosterol synthesis.

**Dose**

- **Adults:** 250 mg orally once daily for 6 weeks (fingernails) or 12 weeks (toenails).
- May also be used in pulse therapy (e.g., one week on, three weeks off).
- **Efficacy:** High cure rates (76-90%).

**Monitoring**

- Baseline and periodic liver function tests (LFTs) in patients at risk of hepatotoxicity.
- Watch for rare side effects like hepatotoxicity and taste disturbances [17].

**Itraconazole (Second-line or Alternative Therapy)**

- **Mechanism:** Inhibits fungal cytochrome P450, blocking ergosterol synthesis.

**Dose**

- Continuous: 200 mg orally once daily for 12 weeks.
- Pulse: 200 mg twice daily for one week, repeated monthly for 2-3 months.
- **Efficacy:** Slightly less effective than terbinafine [18].

**Monitoring**

- LFTs if treatment exceeds one month or in patients with liver risk factors.
- Drug interactions are significant due to CYP3A4 inhibition.

**Fluconazole (Off-label Alternative)**

- **Mechanism:** Inhibits fungal cytochrome P450 enzymes, disrupting ergosterol synthesis.

**Dose**

150-300 mg once weekly for 3-6 months (fingernails) or 6-12 months (toenails).

**Efficacy:** Moderately effective, with lower cure rates than terbinafine and itraconazole.

**Monitoring**

Renal and liver function tests, especially with long-term use [19].

**General Considerations**

- **Patient Factors:** Consider liver function, potential drug interactions, pregnancy status, and compliance with treatment duration.
- **Duration:** Treatment is prolonged because nails grow slowly, and therapy must eradicate infection in the nail matrix.

- **Combination Therapy:** In severe cases, systemic antifungals may be combined with topical treatments or mechanical debridement to enhance efficacy.
- **Relapse:** Onychomycosis has a high relapse rate; patient education on foot hygiene and recurrence prevention is crucial [20].

**2. Topical Antifungal Therapy**

**Efinaconazole 10% (Jublia)**

- **Mechanism:** Azole antifungal that inhibits fungal ergosterol synthesis.
- **Application:** Apply once daily to the affected nail and surrounding skin using the dropper bottle.
- **Duration:** 48 weeks.

**Efficacy**

- Cure rates: 15-18% for toenails.
- Best suited for superficial infections or patients who cannot tolerate systemic therapy.

**Advantages**

No debridement required, easy to apply [21].

**Tavaborole 5% (Kerydin)**

- **Mechanism:** Inhibits fungal protein synthesis by targeting leucyl-tRNA synthetase.
- **Application:** Apply once daily to the affected nail and surrounding skin using a brush applicator.
- **Duration:** 48 weeks.

**Efficacy**

- Cure rates: 6-9%.
- Effective against dermatophytes and non-dermatophyte molds.

**Advantages**

Suitable for patient's intolerant of systemic therapy [22].

**Ciclopirox 8% Nail Lacquer (Penlac)**

- **Mechanism:** Disrupts fungal cell membrane integrity by chelating metal ions.

**Application**

- Apply once daily to the affected nail (and 5 mm surrounding skin).
- Remove buildup weekly with alcohol and trim/debride nails as needed.
- **Duration:** 48 weeks.

**Efficacy**

Cure rates: ~5-8%, improved with debridement or combination therapy.

- **Advantages:** Affordable and widely available [22, 23].

**Amorolfine 5% Nail Lacquer**

(Not FDA-approved in the U.S., but available in other countries)

- **Mechanism:** Inhibits ergosterol synthesis, leading to fungal cell death.
- **Application:** Once or twice weekly.
- **Duration:** 6-12 months.
- **Efficacy:** Cure rates ~30-40%, better with debridement [24].

**Key Considerations for Topical Therapy**

**Indications**

- Nail plate involvement ≤50%.
- Limited to distal and lateral subungual areas.
- Absence of matrix involvement.

**Advantages**

- Low risk of systemic side effects.
- No need for liver or kidney function monitoring.

**Disadvantages**

- Long treatment duration (6-12 months).
- Lower cure rates compared to systemic therapy.

**Combination Therapy:** Topical treatments can enhance the efficacy of systemic antifungals, particularly in severe cases.

1. **Patient Compliance:** Regular application and proper nail care are essential for success [25].

**Combination Therapy**

**Common Drugs**

- **Terbinafine:** Oral antifungal that inhibits fungal ergosterol synthesis. Often first-line therapy.
- **Itraconazole:** Effective for dermatophytes, non-dermatophyte molds, and yeast infections.
- **Fluconazole:** Used for Candida infections or when terbinafine is not an option.

**Advantages**

High efficacy due to penetration into the nail matrix.

**Limitations**

- Potential for side effects (e.g., liver toxicity, drug interactions).
- Contraindications in certain populations (e.g., liver disease, pregnancy) [26].

**Physical and Procedural Therapies**

**Laser Therapy**

- **Types:** Nd:YAG laser, diode lasers.
- **Mechanism:** Heat or light energy targets fungal cells.
- **Effectiveness:** Often used as an adjunct to antifungal therapy.

**Nail Debridement**

- Mechanical or chemical removal of infected nail material.
- Reduces fungal load and improves penetration of topical agents.

**Surgical Nail Removal**

Reserved for severe cases or when other treatments fail [29].

**Combination Strategies**

**Systemic + Topical Therapy**

- Most common approach in combination therapy.
- Example: Terbinafine + efinaconazole.

**Systemic + Laser Therapy**

- Enhances efficacy by targeting the nail bed directly.
- Example: Terbinafine + Nd:YAG laser.

**Topical + Procedural Therapy**
Example: Ciclopirox + periodic nail debridement [30].

**Novel Adjuncts**
**Photodynamic Therapy (PDT)**
- Photosensitizing agents (e.g., methylene blue) combined with light exposure.
- Emerging but still under research.

**Antifungal Powders and Sprays**
- Used to reduce recurrence and reinfection risk.
- Example: Tolnaftate spray [31].

**Laser and Photodynamic Therapy**
**Laser Therapy**
**Mechanism of Action**
Lasers use light energy to generate heat, which destroys fungal cells or inhibits their growth by:
- **Selective photothermolysis:** Targeting specific structures like fungal pigments (melanin).
- **Thermal damage:** Heating the nail plate and bed to temperatures lethal to fungi.

**Types of Lasers**
**Nd: YAG Laser (1064 nm or 532 nm)**
- Most commonly used.
- Penetrates deeply into the nail plate and bed.

**Diode Lasers (805-980 nm)**
- Provides effective heat generation.
- Shorter treatment sessions compared to some other lasers [32].

**$CO_2$ Lasers**
- Used primarily for ablation of the nail plate.
- May facilitate penetration of topical antifungals.

**Efficacy**
- Clinical improvement rates range from **50% to 80%**, depending on the severity of the infection and the laser type used.
- Repeated sessions (often 3-6 spaced 1-4 weeks apart) are usually required for optimal results.

**Advantages**
- Non-invasive and well-tolerated.
- Minimal systemic side effects.
- Can be used in combination with topical or systemic therapies.

**Limitations**
- High cost per session.
- Efficacy may be lower than systemic antifungals, particularly in severe cases.
- Recurrence is common without adjunctive therapy [33].

**Photodynamic Therapy (PDT)**
**Mechanism of Action**
- PDT combines a photosensitizing agent (applied to the nail) with a specific wavelength of light.
- Activation of the photosensitizer generates reactive oxygen species (ROS), leading to fungal cell death.

**Common Photosensitizers**
**Methyl aminolevulinate (MAL)**
Used in combination with red light (630 nm).

**5-Aminolevulinic Acid (ALA)**
Applied topically; activated with blue or red light [34].

**Methylene Blue**
A newer option; activated by lasers or LEDs.

**Efficacy**
- Studies report success rates of 40%-70%, with lower recurrence rates when combined with other therapies.
- Typically requires multiple sessions, spaced every 1-2 weeks.

**Advantages**
- Targeted treatment with minimal systemic effects.
- May also improve nail appearance by promoting new growth.

**Limitations**
- Photosensitizers may cause irritation or photosensitivity in some patients.
- Multiple sessions are required, which increases cost and time.
- Availability is limited in many regions compared to laser therapy [35].

**Surgical Intervention**
**Types of Surgical Interventions**
**1. Nail Avulsion (Partial or Complete)**
**Description**
- The infected nail plate is surgically removed, either partially or completely.
- Can be performed using manual tools (e.g., scissors, nippers) or chemical agents.

**Indications**
- Severe pain or discomfort caused by thickened or deformed nails.
- Secondary bacterial infections.
- Severe or resistant onychomycosis.
- Adjunctive treatment to improve topical antifungal penetration.

**Procedure**
- Local anesthesia is applied.
- The nail plate is detached and carefully excised from the nail bed.
- Wound care involves regular dressing changes and antiseptic application.

**Advantages**
- Rapid reduction in fungal burden.
- Immediate relief of pain or pressure caused by thickened nails.

**Limitations**
- Invasive with potential for discomfort during recovery.
- Recurrence is possible unless antifungal therapy is continued.

**Chemical Nail Removal (Chemical Avulsion)**
**Description**
The nail plate is dissolved using chemical agents such as urea ointments (40-50%) combined with salicylic acid (20-30%).

**Procedure**
- The ointment is applied to the nail, covered with an occlusive dressing, and left in place for several days.
- The softened nail is then gently removed without surgery.

**Advantages**
- Painless and non-invasive.
- Ideal for patients unable to undergo surgical avulsion.

**Limitations**
- Time-consuming process (takes days to weeks).
- Not suitable for severe or deeply infected nails [36].

**Matrixectomy**
**Description**
- The nail matrix (responsible for nail growth) is destroyed to prevent regrowth.
- Performed using surgical tools, chemical agents (e.g., phenol), or laser.

**Indications**
- Chronic or recurrent onychomycosis with significant nail deformity.
- Cosmetically unacceptable nails.
- Painful or incurable cases despite multiple treatments.

**Procedure**
Following avulsion, the nail matrix is destroyed under local anesthesia.

**Methods include**
- **Chemical Matrixectomy:** Phenol or sodium hydroxide application.
- **Surgical Matrixectomy:** Complete excision of the nail matrix.
- **Laser Matrixectomy:** $CO_2$ laser ablation.

**Advantages**
Permanent solution; no regrowth eliminates risk of reinfection.

**Limitations**
- Irreversible; loss of nail can impact appearance and function.
- Post-operative wound care is required [34].

**Advantages of Surgical Interventions**
- Quick reduction of fungal burden.
- Allows better penetration of topical antifungal agents.
- Relieves pain and discomfort caused by thickened or deformed nails.
- Prevents secondary complications, such as bacterial infections.

**Disadvantages and Risks**
- **Pain and Discomfort:** During and after the procedure.
- **Infection:** Risk of bacterial infection during the healing process.
- **Recurrence:** Without proper antifungal follow-up therapy.
- **Cosmetic Concerns:** Removal or permanent loss of the nail can be cosmetically unappealing.

**Post-Surgical Care**
**Wound Care**
- Daily cleaning with antiseptics (e.g., iodine or chlorhexidine).
- Application of antibiotic ointments.
- Protective dressing to avoid trauma or infection.

**Adjunctive Antifungal Therapy**
- Topical or systemic antifungals to prevent recurrence.
- Examples: Terbinafine, ciclopirox, or efinaconazole [37].

**Follow-Up**
- Regular monitoring for signs of infection or recurrence.
- Nail regrowth (if applicable) may take 9-12 months.

**Preventive Measures**
**Foot and Nail Hygiene**
**Keep Feet Dry**
Fungi thrive in moist environments. Dry your feet thoroughly, especially between the toes, after bathing or sweating.

**Wash Feet Regularly**
Use soap and warm water daily to clean your feet.

**Clip Nails Properly**
Trim nails straight across and avoid cutting them too short to prevent trauma.

**Avoid Nail Trauma**
Protect toenails from injuries by wearing properly fitting shoes.

**Disinfect Nail Tools**
Clean nail clippers and files with alcohol after each use. Avoid sharing tools [40].

**Footwear Practices**
**Choose Breathable Shoes**
Wear shoes made of materials like leather or mesh that allow airflow.

**Use Antifungal Sprays or Powders**
Apply antifungal sprays or powders to shoes and socks to reduce fungal growth.

**Alternate Shoes**
Avoid wearing the same pair of shoes every day to allow them to dry completely.

**Wear Moisture-Wicking Socks**
Choose socks made from synthetic fibers that draw moisture away from the skin. Change socks if they become damp.

**Avoiding Public Exposure**
**Protect Feet in Public Areas**

Wear shower shoes or flip-flops in communal areas like swimming pools, gyms, and locker rooms.

**Disinfect Shared Surfaces**
Clean shared surfaces (e.g., yoga mats, pedicure chairs) with antifungal sprays or wipes.

**Boosting Nail Health**
**Moisturize Nails**
Use a non-greasy moisturizer to keep nails and surrounding skin healthy and less prone to cracking.

**Avoid Nail Enhancements**
Minimize the use of nail polish, acrylics, or gels, which can trap moisture and create an environment for fungal growth [33].

**Avoid Cutting Cuticles**
Cutting cuticles can damage the protective barrier, increasing the risk of infection.

**Lifestyle Modifications**
**Manage Sweat**
Use antiperspirants or foot powders if you have sweaty feet (hyperhidrosis).

**Control Underlying Conditions**
Manage chronic conditions like diabetes or circulatory issues that predispose to fungal infections.

**Avoid Walking Barefoot Outdoors**
Particularly in damp, humid areas where fungi thrive.

**Preventing Reinfection Post-Treatment**
**Continue Topical Antifungal Use**
Apply antifungal creams or nail lacquers as directed, even after the infection clears, to prevent recurrence.

**Sterilize Shoes and Socks**
Use antifungal sprays or UV sanitizers to kill residual fungal spores in footwear.

**Replace Old Footwear**
Consider replacing shoes and insoles that may harbor fungal spores.

**Awareness of Risk Factors**
**Monitor Nails Regularly**
Check for early signs of infection, such as discoloration or thickening, and seek treatment promptly.

**Educate Family Members**
Prevent cross-infection by ensuring that others in the household follow similar preventive measures.

**Avoid Overexposure to Water**
Excessive water exposure (e.g., swimming, dishwashing) can soften nails and increase susceptibility.

**Use of Prophylactic Antifungals**
**Topical Preventive Agents**
Regular use of antifungal powders, sprays, or nail lacquers (e.g., amorolfine or ciclopirox) can reduce the risk of reinfection [36].

## Conclusion

In conclusion, onychomycosis is a common and often persistent fungal infection of the nails, typically caused by dermatophytes, yeasts, or molds. It affects both toenails and fingernails, with toenail infections being more prevalent due to factors such as moisture, warmth, and poor circulation. While the infection can lead to disfigurement, discomfort, and potential complications, it can usually be managed effectively with appropriate antifungal treatments, which may include topical therapies, oral medications, or in some cases, laser treatment. Early diagnosis and treatment are crucial in preventing the infection from worsening or spreading. Additionally, adopting preventive measures such as maintaining good nail hygiene, keeping nails dry, and avoiding exposure to fungal sources can help reduce the risk of onychomycosis. Overall, while the condition may require prolonged treatment, most cases can be effectively treated with a combination of medication and preventive care.

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