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Review

Art of Prevention: The importance of tackling the nail biting habit

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ABSTRACT

Onychophagia, commonly referred to as nail biting, is a chronic condition that is repetitive and compulsive in nature, and generally seen in children and young adults. Multiple factors play a role in the development of nail biting, ranging from genetic components to underlying psychiatric conditions. Complications of chronic, compulsive nail biting range from obvious distortion of the nail bed unit to unguinal and oral infection. Dental hygiene is typically less well-maintained in patients with nail-biting disorders, and teeth may become chipped or notched and gums many become inflamed. Treatment of nail biting involves a multidisciplinary team that provides social, psychiatric, dermatologic, and dental care. Treatment ranges from psychotherapy modalities to medication trials of selective serotonin reuptake inhibitors and N-acetylcysteine. Proper nail hygiene remains a mainstay in the prevention of the complications of chronic nail biting. Additional supportive measures include the support of self-motivational novels and television episodes that help children learn coping mechanisms.

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Introduction

Onychophagia, commonly referred to as nail biting, is a chronic condition that is repetitive and compulsive in nature. Although commonly only seen in children and young adults, there is a paucity of related epidemiologic studies. A review of the literature demonstrates that multiple stressors can cause an exacerbation of impulsive nail biting, ranging from school stress to family dysfunction (Halteh et al., 2017). The exacerbation can be explained by underlying anxiety, creating a feed-forward impulsive behavior that helps soothe the patient. Other researchers suggest that nail biting is a form of attention seeking in children and adolescents (Illingworth, 1964). The aim of this article is to present multiple preventative and therapeutic strategies to curb nail biting to prevent long-term consequences.

Prevalence and etiology

The current literature estimates the prevalence of nail biting at 20% to 30% of the general population (Halteh et al., 2017; Pacan et al., 2014). Nail biting is more prevalent in children, with one study noting a 37% prevalence among individuals age 3 to 21 years (Winebrake et al., 2018) Fig. 1. Leung and Robson (1990) describe a downward trend in prevalence as affected individuals reach adulthood and beyond. However, nail biting remains prevalent among young adults, with one study reporting a 21.5% prevalence among those age 18 to 35 years (Halteh et al., 2017). There are inconsistencies regarding differences in prevalence based on sex, with studies reporting anywhere from a higher predilection in boys to a higher female predominance and some studies even report no difference (Leung and Robson, 1990; Pacan et al., 2014).

Although the exact etiology of nail biting is yet to be elucidated, individuals experience this phenomenon differently. Some are consciously aware of their nail-biting habit, whereas others unconsciously bite their nails under specific triggers or circumstances (Pacan et al., 2014). On the other hand, compulsive nail biting may be a sign of psychiatric illness that can have both dermatologic and dental consequences. Previous genetic studies describe a positive genetic factor in play, where >30% of patients with onychophagia have a family member with the disorder (Bakwin and



Fig. 1. Young child's hand with mild nail biting.

Bakwin, 1972). Twin concordance studies support a potential genetic component because monozygotic twins were more likely to have the disorder compared with dizygotic along with an attributable influence of 50% (Ooki, 2005). The same study reported that patients with both parents reporting a history of nail biting had a 3- to 4-fold greater risk of developing a nail-biting disorder (Ooki, 2005).

Diagnostic and statistical manual of mental disorders and psychiatric associations

Nail biting may be a normal phenomenon during childhood; however, the exact criteria for pathologic nail biting are not clearly defined (Ghanizadeh, 2011). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, categorizes chronic nail biting as other specified obsessive-compulsive disorder (OCD), classified in the same group as compulsive lip biting, nose picking, and hair pulling (American Psychiatric Association, 2013). More specifically, the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, labels nail biting as body-focused repetitive behavior. To meet these diagnostic criteria, patients must have failed attempts at suppressing the compulsive behavior even in the face of negative social impact (American Psychiatric Association, 2013).

Currently, studies are inconsistent when comparing the association between OCD and comorbid compulsive nail biting (Halteh et al., 2017). Similar inconsistent data exist when searching for an association between anxiety and nail biting. For example, a report by Pacan et al. (2014) found that only 25% of patients who suffer from a nail biting disorder met the criteria for a diagnosis with a comorbid OCD or anxiety disorder. The same study also found a prevalence of 3.1% for OCD in nail biters, which is similar to the prevalence in the general population (Pacan et al., 2014). An article by Ghanizadeh (2008) reported that 56% and 46% of mothers and fathers, respectively, of children with a nail-biting disorder suffer from a psychiatric illness, with depressive disorder being the most common disorder.

Differential diagnosis

Dermatologists should be cognizant of nail disorders that can be mistaken as onychophagia. One such disease is onychomycosis, a fungal infection of the nail that may lead to discoloration and nailbed destruction. Another nail disorder on the differential is nail psoriasis, which presents as pitting, nailbed separation, discoloration, and splinter hemorrhages (Jiaravuthisan et al., 2007). Patients may reveal a history of arthritis or cutaneous manifestations of psoriasis, including extensor plaques with scaling. Lichen planus is an inflammatory mucocutaneous disease that may be mistaken for onychophagia (Goettmann et al., 2012). An examination of the fingernails will reveal thin and ridged nail plates. Occasionally excess scar formation over the cuticle may result in a pterygium.

Patients typically have concomitant purple, polygonal papules and plaques along the skin and mucous membranes. Additionally, immune-mediated disruptions responsible for vasculitides, including leukocytoclastic vasculitis, have the potential to cause inflammation along the nailbed microvasculature (Damevska et al., 2017). Patients will present with nail abnormalities, including transverse depressions along the nail and separation of the nail plate. Subungual melanoma is a rare but morbid cause of nail abnormalities that is difficult to diagnose due to subtle characteristics, such as melanonychia (black or brown discoloration of the nail that extends distally) and extension of pigmentation changes in adjacent skin (Cochran et al., 2014).

Risk factors

To date, few risk factors for nail biting have been identified. Bottle feeding for an extended period of time, along with pacifier use, are considered potential risk factors (Sabuncuoğlu et al., 2014). Soothing activities, such as thumb and pacifier sucking, are considered the first coordinated muscular activities formed by an infant (Turgeon-O'Brien et al., 1996). The suckling reflex is initially necessary for infants to feed. These behaviors normally phase out by age 3 years; however, the onset of nail biting is speculated to be a pathologic continuation (Tanaka et al., 2008).

Complications

Complications of chronic compulsive nail biting range from obvious distortion of the nailbed unit to ungual and oral infection. The act of chronic trauma to the nail unit may cause progressive nail shortening combined with degeneration of the distant nailbed (Daniel et al., 2005; Lee, 2009). Paronychia, or infections of the soft tissue surrounding the nailbed, are a common consequence of chronic compulsive nail biting. In addition, infections from papilloma and herpes viruses can lead to the development of contagious warts and vesicular lesions after orodigital transmission (Szinnai et al., 2001; Tosti and Piraccini, 2001).

The oral cavity has a higher susceptibility to infection and trauma in patients with chronic compulsive nail biting. This population is known to have a higher bacterial burden, specifically Enterobacteriaceae (Reddy et al., 2013). There is always a risk of pathogen seeding and transfer of fomites between the oral cavity and digits. Motghare et al. (2015) delineates an association between chronic nail biting and temporomandibular joint disorders. Dental hygiene is typically less well maintained in patients with nail-biting disorders, and teeth may become chipped or notched along with inflamed gingiva. Biting pressure may lead to small fractures at the edges of incisors, apical root resorption, alveolar destruction, or gingivitis (Sachan and Chaturvedi, 2012). Also, continuous nonphysiological mechanical forces may lead to clinical dental crowding, rotations, or malocclusion.

Prevention and treatment

Treatment of nail biting involves a multidisciplinary team that provides psychosocial, psychiatric, dermatologic, and dental care. Initial care involves engaging the patient and parents. Subsequently, teachers and close acquaintances may be called upon to reinforce supportive behavior modification. The home atmosphere should be a sympathetic and loving environment for the child or adolescent, with continuous words of encouragement to boost self-confidence. Any siblings should be on board with the treatment plan and avoid laughing at the behavior (Ghanizadeh and Shekoochi, 2011). In children, an assessment of disease severity is important before proceeding to formal intervention because the disease process of nail biting has a heavy psychosocial component. Children with mild nail-biting behavior typically outgrow the activity, seeing peers with healthier nail hygiene and wanting to fit in. Rushing to treat younger children can cause them to increase the behavior to seek more attention (Tanaka et al., 2008).

Dermatologists may recommend a form of aversive therapy to patients by applying a distasteful coating over the nail to discourage patients from biting. This method has shown improvement in reducing impulsive nail-biting behavior; however, the method should be avoided for patients suffering from an underlying compulsive disorder (Koritzky and Yechiam, 2011). In addition, olive oil has been shown to decrease biting behavior by making the nail feel softer without causing distress to the child (Isaacs, 1935).

Alternative topical products include 1% clindamycin, quaternary ammonium compounds, and 4% quinine suspended in petroleum (Tosti and Piraccini, 2000). For patients suffering from severe nail dystrophy, using an adhesive bandage to cover the injured fingers and nail can help prevent further damage.

Prevention through nail hygiene remains key in avoiding nail infections and their sequelae. Nail grooming with trimmed nails and frequent manicures protect the nail and reduce satisfaction from nail biting. Preventing nail biting is important because the behavior may precipitate acute paronychia. Dermatologists involved in the care of the nail-biting patient should immediately treat acute paronychia with appropriate antibiotic drugs or warm compresses to halt disease progression and prevent abscess formation or osteomyelitis. However, acute paronychia may be secondary to viral and fungal infections as well. Cytology is a useful technique to determine the causative agent and appropriate management (Durdu and Ruocco, 2014).

Another therapeutic approach is done by using cognitive behavioral therapy to address the intrusive behavior. Cognitive behavioral therapy is based on both the behavior and a cognitive model, and mechanistically works to limit maladaptive coping behaviors (Rothbaum et al., 2000). Historically, a limited number of case reports describe the use of aversive hypnosis to effectively reduce chronic nail biting (Leshan, 1942). Most recently, Bornstein et al. (1980) proposed a combination of hypnotherapy with behavioral modification to improve habitual nail biting and promote remission. Token economy is used to encourage positive behaviors through reinforcement with rewards (Ivy et al., 2017).

Functional analysis therapy has shown utility by focusing on rewiring a habit and relying on the presumption that nail biting is learned behavior (Dufrene et al., 2008). This type of therapy evaluates specific environments and situations that may be the stimulus for repetitive behavior, such as nail biting. For example, a researcher may evaluate a patient in multiple environments to determine the frequency of nail biting (e.g., conversation on nail biting vs. conversation void of nail biting). Dufrene et al. (2008) showed that functional analysis data may be used to formulate targeted treatment aimed at behavior reduction and eventual extinction.

On the other hand, habit reversal therapy (HRT; e.g., chewing gum rather than biting nails during impulses) provides patients with a way to form awareness of the habit and alternative methods to cope (Woods et al., 1999). HRT includes three components: Awareness training, competing response training (e.g., gum chewing rather than nail biting), and a social support system (Magid et al., 2017). Twohig et al. (2003) reported a significant increase in nail length when using HRT compared with placebo.

Aversive therapy under the guidance of a professional may provide nail biting relief as well. Silber and Haynes (1992) compared the use of a competing response (e.g., clenching first for several minutes to produce discomforting tension) and the application of a bitter substance to the nails, showing a significant improvement in nail length with competing response group. This modality must be correctly used because shaming and punishment for nail biting is associated with adverse outcomes, potentiates the compulsion, and is not recommended as a treatment service line (Tanaka et al., 2008). Aversive therapy can be a component of a three-step behavior modification technique known as stimulus control procedures (Magid et al., 2017). The three steps involve removing environmental triggers (e.g., splintered cuticles), increasing the difficulty to bite nails (e.g., bandaging fingers), and removing positive reinforcements (e.g., adding aversive substance to the nails).

Pharmacotherapy is a second-line treatment for nail biting in children and adolescents. Fluoxetine, a selective serotonin reuptake inhibitor (SSRI), has been shown in several cases to treat onychophagia (Velazquez et al., 2000). On the basis that chronic nail

biting is within the OCD umbrella and specifically body-focused repetitive behavior, SSRIs have been proven to attenuate compulsions. Clinicians should be careful with prescribing other drugs within the SSRI family because studies show that this class of drugs can exacerbate impulse-related disorders (Denys et al., 2003). Tricyclic antidepressant drugs, such as clomipramine, are also noted in several cases to provide relief (Leonard et al., 1991). The antioxidant and glutamate modulator N-acetylcysteine has shown positive outcomes in the treatment of repetitive disorders, including onychophagia (Ghanizadeh et al, 2013; Sani et al., 2019). A randomized clinical trial by Ghanizadeh et al. (2013) showed a reduction in nail biting after treatment with 800 mg of N-acetylcysteine per day over a 1-month period in a cohort of children compared with placebo. The exact mechanism is unknown, but researchers speculate that a reduction of glutamate synaptic release may play a role in decreased nail biting.

Multidisciplinary care team

Annual follow-up visits with primary care physicians and dentists are recommended to identify early infection and allow for proper treatment (Schneider and Peterson, 1982). Annual dentist visits are also encouraged to evaluate for gingival and dental pathologies and initiate early intervention. Dermatologists should remain involved in the care of patients suffering from persistent periungual infections and nail dystrophy. Infectious disease specialists may need to be consulted for antibiotic resistant infections. Patients with comorbid psychiatric illnesses may benefit from psychiatric visits with a mental health provider to explore therapeutic techniques.

Practical intervention pearls

Proper nail hygiene

Proper nail hygiene is essential and includes keeping the nails trimmed and filed. Interestingly, allowing girls to have professionally manicured nails may keep adolescents engaged in not biting their nails secondary to positive cosmetic appeal (Tanaka et al., 2008). Nail cosmetic products may act as both a treatment for nail biting and a method to mask severe nail dystrophy while the nail is healing (Iorizzo et al., 2007).

Gum chewing

Gum chewing may be an effective alternative option to curb the compulsion to bite nails in socially stressful situations for an older child when other coping mechanisms cannot be utilized. This results in better oral hygiene and is (Massler and Malone, 1950). Sorbitol-based gum rather than a sugared variety can help prevent caries (Ly et al., 2008).

Books and social media

Books and social media can provide support and strategies. One great resource in addressing a child's nail biting is using the interactive book titled *What to Do When Bad Habits Take Hold* by Dr. Huebner, 2008. This book creates a unique and fun self-exploration in identifying bad habits, such as nail biting, to bring self-awareness, followed by tips and tricks to curb the habit. For children who prefer a more visual approach, an episode of the Bernstein Bears creatively addresses nail biting in a comfortable and enlightening episode and can be streamed for free on YouTube (YouTube, 2014).

Reward system

Parents also can apply token economy to curb nail biting behavior. Creating a sticker chart for children and adding a sticker each day the child keeps nails free from biting damage keeps children motivated, knowing that a prize is available after multiple good days in a row (e.g., 2 weeks straight to begin with). Children with enuresis have successfully been treated using a similar strategy (Ortiz and Garzon, 1978).

Mindfulness techniques

Bringing awareness to the habit can help create self-awareness and search for socially acceptable ways to cope with stress and anxiety. Cognitive therapy suggests that persons engage in alternative behavior to distract from intrusive impulses, such as arts and crafts, sports, and musical instruments, to improve confidence and focus and reduce distress (Massler and Malone, 1950). Furthermore, nail biting may be a source of transmission for viruses and bacteria (e.g., touching communal water fountain spigot and then transferring fingers to the mouth). The coronavirus that caused the coronavirus disease of 2019 was shown to remain on surfaces for up to 3 days (van Doremalen et al., 2020). As a consequence, strong recommendations to avoid face touching would also apply to the recommendation to stop nail biting behavior.

Conclusion

Nail biting can be a chronic and debilitating habit that may continue into adulthood, and can be both a source and transmitter of disease. Although related to stress, the habit also can contribute to severe psychosocial distress. Knowing the appropriate preventative steps and treatment plans for children and adolescents can help prevent habit permanence. When considering that nail biting can transmit deadly disease, breaking this habit can be lifesaving.

Conflicts of Interest

None.

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Study approval

The author(s) confirm that any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant bodies.

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