

# Nail Biting; Etiology, Consequences and Management

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## Abstract

Nail biting (NB) is a common, but unresolved, problem in psychiatry, psychology, medicine and dentistry. While it seems that NB is a simple behavior that can be stopped easily, many of the children with NB have already tried to stop it, but they have not been successful. The frustrations due to failed attempt involve others such as parents and siblings. The present review aims at providing an overview of prevalence, comorbidities, education and counseling, and management for NB. Overall, the reviewed literatures suggest that comorbidities of psychiatric disorders and other stereotypic behaviors in clinical sample of children with NB is more than 80%, and more than half of the parents suffer from psychiatric disorders mainly depression. Treatment of NB, however, is not as easy as it seems. The management of NB is much more complicated than just focusing on stopping it. Nail biting cannot be managed without considering its co-morbidities, antecedents and consequences. It might be concluded from the reviewed literature that children with NB, parents, siblings, and teachers should be educated about what to do and what not to do about NB. Punishment is not effective. Moreover, clinical randomized controlled trials are required to make available evidence-based behavioral and pharmacologic treatment protocols.

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**Keywords** • Nail biting • prevalence • etiology • outcomes • treatment

## Introduction

Nail biting (NB) has been a less-published area in the literature of both of psychiatry and dermatology.<sup>1,2</sup> Medicine, psychology and dentistry have been unable to resolve the problem of NB.<sup>3</sup> While individuals who practice NB usually like to stop it, their efforts to put an end to it have failed. The parents of a sizable number of children, whom are referred to clinics for the management of NB, have tried to help their children by means such as coating nail plate with substance that have unpleasant taste. Sometime they have covered the nails with rubber or cloth finger protectors. These measures do not usually lead to a permanent fading of this behavior. Many of children with NB behavior may be punished by their parents or family members. Punishment and threat may not lead to the decrease of NB frequency, in fact may lead to an increase in it. Sometimes, individuals with NB behavior may say that they are powerless or unable to stop this unwanted behavior. There is a speculation that NB may guide clinicians to a better pharmacological management of children with attention deficit hyperactivity disorder (ADHD).<sup>4</sup>

## Definition

The crossing of any digit from an individual's lips is called NB.<sup>5,6</sup> Operational definition of NB is "putting one or more fingers in the mouth and biting on nail with teeth".<sup>7</sup> Nail biting is called onychophagia as well. The habit of NB is often limited to fingernails, and most of individuals with the habit do not have any preference for biting any of the fingernails.<sup>8</sup> This behavioral problem has been reported in children and adults.

## Classification

Nail biting is not a pathological condition in all times and all clients. However, it is not exactly clear where the border between the healthy and unhealthy behavior of NB is. Nail biting in healthy children is temporary, and does not last very long. The frequency, intensity and duration of pathological NB are higher than those in normal individuals. Uncertainties for the distinction of pathological and non-pathological NB are also reflected in the classification of psychiatric disorders. While some behavioral problems such as trichotilomania are classified as an impulse control disorder in Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), NB is not classified in DSM-IV.<sup>6</sup> Nail biting can also be classified as a self-injurious behavior such as pathological skin-picking or as a stereotypic movement disorder.<sup>9</sup> Others believe that NB is a part of obsessive compulsive disorder spectrum.<sup>2</sup>

## Epidemiological Factors

Nail biting usually does not start until the age of three or four years.<sup>3</sup> There are contradictory reports about the prevalence of NB. The prevalence of NB increases from childhood to adolescence, and then decreases in adulthood.<sup>3</sup> It is not clear what percentage of the children with NB behavior stops it, and will not suffer from it later.

The rates of NB in seven to 10-year-old children and during adolescent are suggested being 20–33% and 45%, respectively.<sup>8</sup> In a study on a community sample of school aged children in Iran it was indicated that the rate of NB in boys and girls were 20.1% (95% CI: 15.9 to 24.2) and 24.4% (95% CI: 20.1 to 28.7), respectively. Nail biting was not related to gender, conduct problems, inattentiveness, hyperactivity, and peer problems. Moreover, the rate of NB in at least one of the family members of children with NB was 36.8% (95% CI: 22.3 to 44.2).<sup>10</sup> Another study on American three to

six-year-old preschool children indicated that the rate of NB was 23%.<sup>11</sup> Nail biting is age-related, and its prevalence decreases with the increase of age.<sup>11</sup> The rate of NB in school children in Mangalore, India, was 12.7%, and it was more prevalent in girls than boys.<sup>12</sup> The rates of NB in less than 12-year-old twins were 28% in boys and 26% in girls. It co-occurred with finger sucking in 17.7% of boys and 15.7% of girls.<sup>13</sup> About 21.5% of male adults are nail biters.<sup>14</sup>

A study on 5554 children (5-13 years old) in Delhi indicated that the prevalence of oral habits such as thumb sucking and lip biting were 25.5% and 3%, respectively.<sup>15</sup> While oral habit was not associated with gender, thumb sucking was more common in girls than in boys.<sup>15</sup>

The rate of finger and NB in patients suffering temporomandibular joint pain and dysfunction was about 24.1%.<sup>16</sup> Therefore, it is recommended to inquire about oral habits such as NB in all temporomandibular joint pain and dysfunction. Moreover, patients with temporomandibular joint pain and dysfunction should be consulted as part of their management.<sup>16</sup>

## Etiological Factors

There are a lot of controversies about the causes of NB. While some studies related NB to behavioral problems,<sup>17</sup> and anxiety,<sup>18,19</sup> others did not believe so.<sup>20,21</sup> Anxiety in children with NB is not a trait; it is a state.<sup>22</sup> The trait which is accompanied with NB is oral aggression.<sup>22</sup> Oral habits including NB have an environmental etiology, and are risk factors for malocclusion development, especially in children older than preschool years.<sup>23</sup> Inadequate motor activity is supposed to be a cause of an increase in NB.<sup>5</sup>

Although, it was suggested that NB might reduce anxiety or tension,<sup>19</sup> recent studies do not support the anxiety theory for NB.<sup>5,24</sup> Nail biting usually occurs as a result of boredom or working on difficult problems rather than anxiety. Nail biter do not bite their nail when they are engaged in social interactions, or when they are reprimanded for the behavior.<sup>24</sup> It is suspected that smoking and gum chewing in adults are substitutes for NB in childhood.<sup>3</sup> Severe and mild NB appear to have some differences in terms of the basis of physical and social consequences, severity, frequency, and physiological mechanisms.<sup>25</sup>

## Co-Morbidities or Underlying Conditions

There are limited reports about co-morbidity of

NB with psychiatric disorders.<sup>6</sup> Three most common co-occurring psychiatric disorders in clinical sample children with NB are attention deficit hyperactivity disorder (74.6%), oppositional defiant disorder (36%), and separation anxiety disorder (20.6%).<sup>6</sup> Other co-morbid disorders include enuresis (15.6%), tic disorder (12.7%) and obsessive compulsive disorder (11.1%), major depressive disorder (6.7%), mental retardation (9.5%), and pervasive developmental disorder (3.2%).<sup>6</sup> Co-morbidity with psychiatric disorder is not associated with gross physical damage, severity or onset age of NB. All of the boys and 81% of the girls of the clinical sample of children with NB suffer from at least one psychiatric disorder.<sup>6</sup> Nail biting is also one of the most common (28.6%) psychiatric problems in children and adolescents with Tourette syndrome.<sup>26</sup>

Other stereotypic behavior problems are very common in children with NB, and their rate is up to 65%.<sup>6</sup> The study,<sup>6</sup> also did not support that NB was associated with anxiety disorders.<sup>6</sup> The most common co-occurring stereotypic behaviors were lip biting (33.3%) and head banging (12.7%).<sup>6</sup> Another study reported that 70% of individuals with hair-pulling habit had other stereotypic behaviors, of which skin-picking and nail-biting were the most common ones.<sup>27</sup> Individuals with NB have higher obsessive compulsive behaviors.<sup>2,18</sup> Fifty six out of 509 individuals with obsessive compulsive disorder had NB.<sup>28</sup>

The rates of co-morbid psychiatric disorders including oppositional defiant disorder, conduct disorder, separation anxiety disorder, generalized anxiety disorder, obsessive compulsive disorder, tic disorder, and major depressive disorder in children with ADHD and NB were not more than those in ADHD children without NB.<sup>29</sup> Nail biting is not associated with enuresis in children with ADHD.<sup>30</sup> Meanwhile, prosocial skills of children with NB were less than those counterparts without NB.<sup>10</sup>

### The Psychiatric Disorders of Parents of Children with Nail Biting

There are a few studies about the association of psychiatric disorders in the parents and NB in their children. The only study that investigated the parents of children with NB reported that about 56.8% of mothers and 45.9% of fathers suffered from a psychiatric disorder, which most often was major depressive disorder.<sup>6</sup> The rate of major depressive disorder in mothers was 46.6% and in fathers was 35.1%. A study on children of mothers with psychiatric

disorders reported that the rate of NB in children of mothers with schizophrenia was more than that in children of mothers with bipolar disorder. Also, the rate of NB in children of mothers with schizophrenia or bipolar disorder was higher than that in the control group.<sup>31</sup>

### Outcomes

Nail biting consequences are not limited to the afflicted individuals, and usually have impact on members of the family. Sometimes, the parents or other family members feel shame from the behavior of their children or siblings. The children or adults with NB might be laughed at or stigmatized by others. Nail biting may cause restriction in social behaviors, or behaviors that should be done in the presence of others using hands such as writing, drawing, or playing. Children with NB are frequently attacked by others. Children with NB are usually told that they are able to control or stop NB, but they do not like to stop it. Attacks not only do not improve NB behavior, but also can add more to the stress, frustration, helplessness, hopelessness and anxiety of the children. In addition, nail biting has effects on the oral carriage of Enterobacteriaceae. The rate of Enterobacteriaceae is more in the oral cavities of children with NB habit than those without it.<sup>32</sup> The force of biting nails can be transferred to the root of teeth and lead to apical root resorption,<sup>33</sup> alveolar destruction,<sup>3</sup> malocclusions,<sup>34</sup> temporomandibular disorders,<sup>23</sup> and gum injuries.<sup>35</sup> Moreover, nail biting may damage the tissue around the nail and lead to infection and teeth root damage.<sup>36</sup> Furthermore, in severe cases, NB may damage the nail beds and cause the disappearing of nails.<sup>37</sup> The growth of nails can be increased by NB.<sup>38</sup> The outcome of NB is not just limited to medical consequences. Nail biting also causes some negative social and psychological consequences for the patients and their parents. Nail biting may decrease individuals' self evaluation, and increase their concerns for others' evaluation.<sup>18</sup> Meanwhile, NB does not seem to be associated with general medical conditions such as fibromyalgia.<sup>39</sup>

### Management and Treatment

Nail biting is a habit that cannot be managed without considering some related factors such as co-morbidities, precedent and consequences of the behavior. Some studies did not recommend the treatment of children with mild NB.<sup>3</sup> Any treatment should be accompanied by

educating the afflicted children as well as their parents, siblings and teachers. They should be taught about what to do and what not to do about it. For example, they should know that punishment, threat or laugh at the children with NB can increase this behavior, because they try to catch others' attention by NB. Sometimes, the parents feel guilty for their children NB habits. These feelings should be detected and managed. Siblings may feel shame for to their brothers' or sisters' NB behavior. So, they need to be included and educated in the process of management as well. Coating nails with unpleasant materials or covering them is tried by many parents, but it is usually ineffective. Others should not blame children with NB habit and increase their disappointments, instead they should encourage them, and give them support and confidence. The management and treatment of child with NB behavior will not happen in a few sessions, it is a long process. All of such clinical findings indicate that the management of NB is much more complicated than just focusing on its stoppage. Treatment is not as easy as it seems. Because NB can damage teeth and alveolar structure, the afflicted children should be referred for the assessment and management of possible damages.

There are some methods suggested for controlling of NB such as chewing gum or wearing a rubber piece on the wrist. However, these approaches need to be studied in control trials for their efficacy. Also, the efficacy of engaging fingers with substitute activities such as writing, drawing, holding small balls, or musical instrument should be investigated.

### Psychotherapy

There are limited controlled clinical studies on behavioral or psychotherapeutic approaches to the treatment of NB. There are some cognitive behavioral techniques for the management of children's behaviors. These techniques have many similarities, and are based on cognitive and behavioral principles such as learning principles. All of them teach some skills to the children to be able to control NB behaviors.

### Functional Assessment Analysis

Nail biting can be a learned behavior according to a cognitive model. In this model, positive, negative, or automatic reinforcement maintains our habits. So, our habits have functions. Identifying conditions and situations in which NB is

most likely to occur allows a therapist to build up a hypothesis for the function of NB. This hypothesis is a base for behavioral analysis and planning of treatment for NB. There are some case reports about the efficacy of functional analysis and treatment of NB.<sup>5</sup> Nail biting occurs more often in boredom or frustration than in contingent or non-contingent attention in undergraduate students.<sup>24</sup> Environmental factors are reasons for NB in some people. However, the environmental determinants of NB may differ in different people. Therefore, functional analysis of NB is a method for assessing the nature of precedent and consequences of NB.<sup>5</sup> It is effective and its effects are stable over time.<sup>5</sup>

### Punishment

Punishment is not effective in the treatment of NB. The effect of punishment is not more than placebo.<sup>24</sup>

### Habit Reversal

Some authors believe that NB is a learned habit, rather than an emotional condition.<sup>36</sup> Habit reversal is a form of behavioral therapy, which uses a similar or dissimilar competing response. Both of the similar and dissimilar competing responses improve oral-digital behavior. The two approaches do not differ from each other in terms of improvement degree or acceptability.<sup>40</sup> There is a controversy about the long-term efficacy of habit reversal training for the treatment of NB.<sup>41</sup> Habit reversal consists of awareness training, relaxation training, competent response training, and contingency management. The recording of NB frequency, videotaping of NB behavior and describing its frequencies increase awareness. Its frequency should be recorded on a card. It will help children to monitor their behavioral changes. Situation awareness is the type of awareness that children with NB habit identify the situations or places in which NB is better or worse. Patients with NB habit can be trained for different types of relaxations such as self-statements of relaxation, visual imagination, muscle relaxation, and deep breathing. For competing response training, a behavioral pattern that is incompatible with NB is introduced. Competing responses should be contingent with NB. There are different types of contingency managements. Parents can comment on improvement of the behavior, and provide some praise for the improved child. For example, the child can

go to some places or enjoy activities that he/she has been avoided before. Competing responses should be practiced every day. Parents should encourage children with NB habit using competing response. Behavioral changes are long processes, and parents and their children should be informed that they will not happen over a few days or weeks. This is very important because parents or children usually give up soon.

Relaxation training may not be included in simplified habit reversal because HR does not suppose that NB is an anxiety reduction behavior.<sup>5</sup> However, more studies are in need to examine the long term effects of habit reversal.

### Competing Response

In this behavioral method, subject perform a competing response whenever he/she has the urge to bite or finds his/hers biting nails. For example, a behavior to stop or avoid moving upper limbs towards face or lips, or a behavior to stop or inhibit entering fingers into mouth is employed. This method has been shown to be more effective than not using it,<sup>36</sup> Competing response type is not important for the suppression of target behavior, and it does not probably function as an incompatible behavior.<sup>42</sup>

### Aversive Stimulus

Aversive stimulus is effective for treating NB, and is usually done through painting of an aversive stimulus or a bitter substance on the individual nails. Aversive stimulus therapy improves NB, although its effect is not as much as the competing response method.<sup>36</sup>

### Self-Control Intervention

Considering that human behavior is goal-directed and affected by different factors, self-control intervention is proposed as a method for the management of NB.<sup>43</sup> In this method, some specific self-control skills are learned and applied by the subjects. The method is performed in a number of steps. First, the children are taught that the targeted behavior is a problem, and they can change it. Second, the children are told to try to find the possible cause of NB as well as the thought and feelings that are associated with the behavior. Third, the children are instructed to do self-monitoring, as it can increase their awareness from the behavior. Forth, children are educated

to use some learned skills such as self-talk and self-reward to change the automated behavior. Fifth, children are trained to use the learned skills to manage and change other similar pathologic behaviors.<sup>43</sup>

### Pharmacotherapy

To the best of the author's knowledge, there is no a double-blind, placebo-controlled trial investigating the efficacy of drugs such as fluoxetine and fluvoxamine for the treatment of NB. There are just a number of case reports about the association of NB with other similar behaviors such as skin picking.

Flouxetine has been reported to be effective for the treatment of chewing of digits.<sup>44</sup> However, there is a report that fluvoxamine and paroxetine induced or aggravated pathological skin-picking, a type of impulsive self injury behavior, in two patients with obsessive-compulsive disorder.<sup>45</sup> Since, NB as an impulse disorder, selective serotonin reuptake inhibitors (SSRIs) may exacerbate it. This suggestion is based on the belief that impulsivity is exacerbated in some impulse-prone patients by SSRIs.<sup>46</sup> It is supposed that NB, trichotillomania, and obsessive-compulsive disorder have a similar biologic etiology.<sup>47</sup> A double-blind comparison of clomipramine and desipramine effects in individuals with NB habit, who did not have obsessive compulsive disorder, indicated that clomipramine was more effective than desipramine.<sup>47</sup> Currently, we are conducting two clinical trials for the treatment of children and adolescents with NB behavior (Irct registration number: IRCT138902303930N2; Irct registration number: IRCT201103023930N3).

### Conclusion

It seems that one possible reason for the lack of success in management of NB by approaches such as wearing nails, coating them with unpleasant substances, and repeated prompting of the children to stop NB is the lack of consideration of NB as a symptom of a more complicated condition. Nail biting is not an isolated symptom. It can be one symptom from a cluster of symptoms, all of which as well as the motivation behind NB should be evaluated, assessed and managed. Randomized controlled clinical trials are required to make evidence-based pharmacologic protocols for the treatment of NB behavior available.

**Conflict of Interest:** None declared

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