

REVIEW

# Trichotillomania and Trichophagia: Modern Diagnostic and Therapeutic Methods

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## ABSTRACT

Trichotillomania is a chronic, mental disease of impulse control, characterized by repetitive, compulsive, and self-induced hair pulling. It can occur at any age but is observed more often in adolescents, with a strong predominance in females. Diagnosis of trichotillomania may be difficult, and its effective treatment challenging. The aim of this study is to critically review current literature regarding diagnostic procedures and treatment of trichotillomania, including psychotherapy, *N*-acetylcysteine, naltrexone, topiramate, atypical neuroleptics, and selective serotonin-reuptake inhibitors. The importance of cooperation between dermatologists and psychiatrists is emphasized to shorten the time to diagnose the disease and begin appropriate treatment. Finally, trichotillomania is also often connected with trichophagia, which may lead to formation of

trichobezoars and cause a direct danger to the patient's health and even life due to the risk of intestinal obstruction and the need for surgical intervention. Based on thorough literature review, we conclude that diagnosis of trichotillomania can be challenging. Trichoscopy could help to distinguish trichotillomania from other types of hair loss. Most clinical trials using various treatment options have been conducted on small groups of patients, and the potential benefits determined using various scales. Therefore, it is difficult to compare the effectiveness of different treatment methods. There is also a lack of studies assessing treatment efficacy over longer periods of time. Thus, there is a need to perform better-designed studies in the near future to optimize current treatment modalities for trichotillomania.

**Keywords:** Hair disorders; Psychotherapy; Treatment; Trichotillomania

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## INTRODUCTION

The term “trichotillomania” was first used by Hallopeau in 1889. It originates from the Greek words “thrix” (hair), “tillein” (to pull), and “mania” (madness). Trichotillomania (TTM) is a chronic, mental disease of impulse control, characterized by repetitive, compulsive, and self-induced hair pulling. It can occur at any age

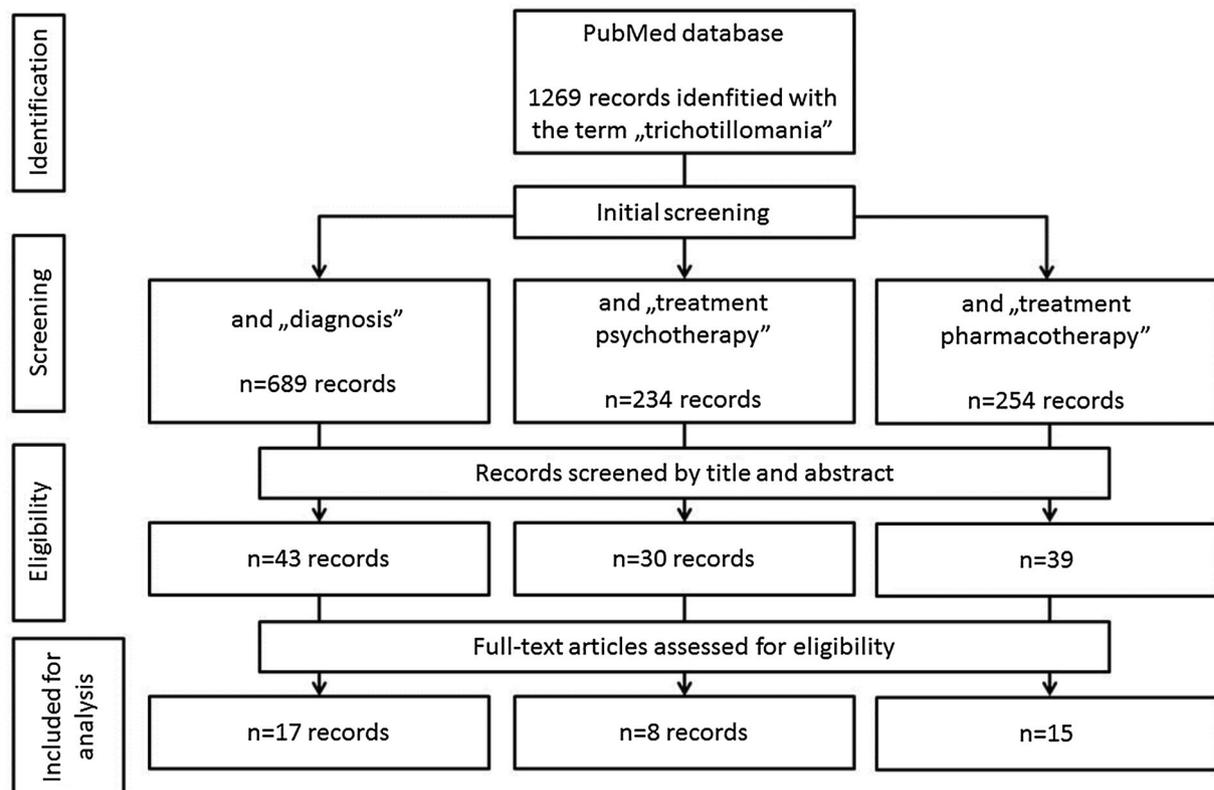
but is observed more often in adolescents, with a strong predominance in females [1, 2]. TTM may also occur in preschool children; however, it generally disappears by school age and is usually considered as a habit, similarly to sucking the thumb. Among teenagers, it usually presents with other psychiatric comorbidities, such as depression, mood or anxiety disorders, and social phobia [1].

To provide greater insight into diagnosis and treatment of TTM, we searched the PubMed database using the following terms: “trichotillomania” and “diagnosis,” “trichotillomania” and “treatment psychotherapy,” and “trichotillomania” and “treatment pharmacotherapy.” After careful selection, a total of 40 papers were included in this review (Fig. 1). This article is based on previously conducted studies and does not contain any studies with human participants or animals performed by any of the authors.

## DIAGNOSIS

Diagnosis of TTM is still challenging. Hair loss (or alopecia) is a common clinical complaint and can be a result of various etiologies. Furthermore, hair loss resulting from different underlying causes may have similar clinical manifestation. Common causes of alopecia in children and adolescents include alopecia areata, congenital alopecia, traction alopecia, tinea capitis, hair cycle disturbances, and TTM [3, 4]. Alopecia may also be a consequence of endocrine disorders, systemic illnesses, unbalanced diet, trauma, infections, genetic predispositions, or drugs [5].

Diagnosis of TTM is based on a careful medical history and detailed physical examination. The favorite site of hair pulling is the frontoparietal region of the scalp, eyelashes, and eyebrows, where hair can be easily reached. However, pubic hair, body hair, or facial hair may also be affected [6]. Physical examination



**Fig. 1** Flowchart of paper selection for review analysis

may reveal focal, nonscarring patches of hair loss with irregular borders, located contralateral to the dominant hand. In doubtful cases, additional examinations may facilitate the correct diagnosis. They include skin biopsy, trichogram, hair pulling test, and trichoscopy [7]. The term “trichoscopy” was coined in 2006 by Rudnicka and Olszewska and refers to dermoscopy of hair and scalp. Nowadays, trichoscopy is considered as a revolutionary, reliable, easy-to-use, and cheap assessment of hair diseases, differentiating various pathologies and enabling continuous observation of patients over time [8, 9].

The most typical trichoscopic features of TTM are hairs broken at different lengths, longitudinal split ends of hairs (short hairs with trichoptilosis), irregular coiled hairs, amorphous hair residues, black dots, “i-hair” (modified black dots which in TTM are remnants of hair shafts arising from broken hair pulled by a patient—this sign is considered as a possible prognostic marker), flame hairs (more common in early childhood; proximal hair residue that remains after pulling anagen hairs), tulip hair (short hairs with darker tulip-shaped ends), V-sign (frayed hair), and yellow dots (Table 1) [10–14]. Less commonly observed features include follicular microhemorrhages, microexclamation mark hairs, upright regrowing hairs, coma hairs, crusts, scales, dirty dots, or honeycomb pigment network [15, 16].

Diagnosis of TTM sometimes ensues through hairball in the emergency room. Trichobezoars (Rapunzel syndrome) can be identified in patients who eat their pulled hairs. Such behavior may lead to gastrointestinal symptoms including nausea, vomiting, abdominal pain, and bowel obstruction and perforation. Fortunately, Rapunzel syndrome is rather rare in TTM [17].

## TREATMENT

### Psychotherapy

It is believed that the most effective form of TTM treatment is psychotherapy, usually behavioral therapy (BT) (Table 1). This form of

treatment is the most commonly used and also the best-known method of TTM treatment. In a randomized study comparing BT and cognitive therapy (CT), 48 patients with TTM diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV and being older than 15 years completed treatment consisting of six therapeutic sessions of CT ( $n = 26$ ) or BT ( $n = 22$ ) [18]. Each participant was informed about methods of monitoring the progress of treatment, and patients were also aware that CT had not been used before in treatment of TTM. Patients were followed for the 3-month treatment-free period. Additional follow-up measurements took place after 12 and 24 months. The effect of both treatment regimens was comparable. Both CT and BT resulted in reduction of TTM symptoms (severity, urge, inability to resist, and negative beliefs) immediately after treatment. Patients in both treatment conditions showed a relapse in TTM symptoms at 3 months follow-up, but the effect sizes for CT after the 3-month treatment-free period were larger than those found for BT in four of five outcome measurements. Nevertheless, at 12 and 24 months follow-ups, the severity of TTM symptoms was very similar in both groups [18].

Recent studies indicate that cognitive behavioral therapy is the most empirically validated treatment for TTM. The effectiveness of behavioral and cognitive therapy has been described in a study on 22 children (mean age  $12.6 \pm 3.0$  years) with primary diagnosis of TTM and with symptoms persisting for more than 6 months. Participants were given eight therapeutic sessions. As many as 77.3% of patients responded positively to treatment, and 63.6% maintained improvement 6 months after end of therapy [19]. Behavioral and cognitive therapy was also tested in Falkenstein et al.’s study [20]. A total of 16 patients aged between 17 and 59 years underwent a 12-week therapy led by trained specialists. Measurements using different scales (Massachusetts General Hospital Hairpulling Scale—MGH-HPS, Psychiatric Institute Trichotillomania Scale—PITS) clearly indicated a significant positive therapeutic effect. Despite good results, the study was conducted

**Table 1** Summary of major findings regarding diagnosis and treatment of trichotillomania (TTM)

Method	Comment
Diagnosis of trichotillomania	
Astute medical interview focused on hair and scalp	Crucial in making the definitive diagnosis
Trichoscopy	Typical trichoscopic features of TTM: hairs broken at different lengths, longitudinal split ends, irregular coiled hairs, hair residues, black dots, “i-hair,” flame hairs, tulip hairs, V-sign (frayed hair), or yellow dots
Psychotherapy	
Behavioral therapy	The most popular method used in treatment of TTM Habit-reversal training (HRT) is a type of behavioral therapy, which is based on awareness training, stimulus control, and competing response practice
Cognitive therapy	A type of psychotherapy that focuses on eliminating the dysfunctional way of thinking Rarely used in TTM, although, according to available studies, has comparable effectiveness to behavioral therapy
Cognitive behavioral therapy (CBT)	Combination of cognitive and behavioral therapy. CBT uses analysis of factors influencing the behavior of the patient, focusing on the cognitive processes they cause. It uses behavioral experiments to provoke changes in thinking Studies indicate the highest long-term efficacy of this method in treatment of TTM
Pharmacotherapy	
Selective serotonin-reuptake inhibitor (SSRI)	Data remain controversial Better long-term effects were obtained by using behavioral therapy than fluoxetine
Tricyclic antidepressants	Clomipramine has been shown to be of greater benefit than desipramine, but the side effects of this drug group discourage their use in TTM in some patients
<i>N</i> -Acetylcysteine	A glutamic acid modulator that may reduce the severity of hair loss symptoms in adults The effectiveness of using this substance in children has not been demonstrated
Atypical neuroleptics	Olanzapine has been shown to be an effective and safe drug for TTM
Naltrexone	Conflicting results on its efficacy in TTM Further studies are needed to define its position in treatment of TTM
Cannabinoid agonists	It has been shown that dronabinol is well tolerated in TTM, but further trials are needed on a larger population of patients to confirm its efficacy
Topiramate	Results indicated the presumed efficacy of topiramate in TTM therapy, but further trials are needed in a larger population of patients to confirm its efficacy
Modafinil	Modafinil is a stimulant used to treat narcolepsy Patients with TTM did not benefit from use of modafinil

on a small group, which reduces their credibility [20].

Another study included 60 adults with a significant predominance of women ( $n = 57$ ) [21]. In the first stage of this study, all participants started therapy by using the dedicated program's website. For 10 weeks, patients learned self-monitoring of behavior, emotions, and rituals associated with the desire to pull their hair. On this basis, a list of behaviors was established, which patients used to combat hair loss. After 10 weeks, significant improvement was seen in eight patients, four of whom reported complete recovery of normal functioning. It is worth emphasizing that these people used the internet more often than the rest of the participants. At the end of the first step, all participants in the project were asked to join the next part of the study, in which 8 weeks of habit-reversal training (HRT) was given. HRT is a type of BT based on awareness training (self-monitoring), stimulus control, and competing response practice (practicing a motor response). In total, 76% of the patients were treated in step 2; 50% of patients improved reliably during step 2 on MGH-HPS, and 46% recovered normal functioning [21].

According to Azrin's study [22], a single session of HRT ( $n = 18$ ) reduced self-reported hair pulling behavior by 99%, compared with a reduction of 58% following 1 day of self-directed negative practice ( $n = 15$ ). Another study evaluated the effectiveness of HRT in comparison with usual treatment which was given to patients prior to an intervention by their healthcare providers. All participants ( $n = 40$ , 85 % females) meeting diagnostic criteria for TTM were randomized to either 8 weekly sessions of HRT by trained therapists or to 8 weeks of treatment "as usual." Patients evaluated therapy effectiveness directly after treatment, and 1 and 3 months later. All assessments were conducted by a trained rater who was blinded to treatment conditions. The results showed that 16/21 participants (76%) were rated as treatment responders in the HRT group versus 4/19 (21%) in the usual treatment group ( $p < 0.001$ ) [23]. In addition, Shareh compared the effectiveness of metacognitive methods combined with HRT (MCT/HRT) in TTM versus waiting list

(i.e., no treatment) and documented significant and durable improvement in the treatment group and no improvement in the waiting list [24].

It is believed that TTM is related to higher risk of co-occurring depression and anxiety disorders. In a large study in 2017, 530 adults with TTM were examined using a variety of clinical measures (including symptom severity, psychosocial measures of functioning, and psychiatric comorbidity) [25]. Among all participants, 58 (10.9%) had major depressive disorders (MDD), 97 (18.3%) an anxiety disorder, and 58 (10.9%) both MDD and an anxiety disorder. Patients with MDD and patients with anxiety and MDD reported the worst level of symptom severity regarding all clinical measures. These results suggest that adults with TTM and co-occurring MDD and anxiety disorders exhibit unique clinical features, which may also have treatment implications [25].

## Pharmacotherapy

### *Selective Serotonin-Reuptake Inhibitors*

Regarding pharmacotherapy, selective serotonin-reuptake inhibitors (SSRIs) are the most often chosen treatment option for TTM in routine clinical practice. However, we found only three studies assessing fluoxetine, a drug belonging to the SSRIs, in TTM. In a 31-week study, Streichenwein and Thornby [26] analyzed the efficacy of fluoxetine in double-blind fashion. A total of 23 adults were screened, and 16 patients (14 women, 2 men) were included into the trial, which consisted of a 2-week washout period followed by 12 weeks of 80 mg fluoxetine daily, 5 weeks re-washout, and 12 weeks placebo. No significant differences were observed between fluoxetine and placebo in terms of the urge to tear hairs, time spent on pulling hairs, and the number of torn hairs. In summary, fluoxetine was not superior over placebo for treatment of TTM [26].

In another study, 21 adults with TTM were subjected to an 18-week placebo-controlled, double-blind crossover study with fluoxetine, at dosages up to 80 mg/day [27]. The duration of the drug and placebo treatment was 6 weeks,

separated by a 5-week washout period. Fifteen patients completed the trial (including 14 women and 1 man). Again, the authors were unable to demonstrate any short-term benefits of SSRIs in treatment of TTM, including such parameters as the severity of hair pulling, the urge to pull hair, the number of hair-pulling episodes, and the estimated amount of hair pulled per week [27].

Van Minnen et al. compared the efficacy of fluoxetine and BT in people aged >16 years [28]. Of the 43 participants in the 12-week trial, 14 patients completed BT (six sessions every 2 weeks), 11 received fluoxetine 60 mg/day, and 15 patients constituted the control group. Nine patients on fluoxetine reported mild to moderate adverse effects: insomnia, drowsiness, fatigue, nausea, dry mouth, dizziness, excessive perspiration, tremor, headache, or delayed orgasm. In one patient with insomnia, the dose of fluoxetine was reduced to 40 mg. The results of the treatment were compared using the MGH-HPS. Better efficacy was observed in the BT group with final effect size of 3.8, compared with 0.42 in the fluoxetine group, and 1.09 in the control group. Clinical improvement was assessed as 64% in the BT group, 20% in the controls, and 9% in the fluoxetine group [28].

Clomipramine with desipramine was compared in 13 women in a double-blind trial for 10 weeks [29]. Better improvement was observed after clomipramine use, as patients reported less urge to tear hairs [29]. Another study evaluated the effects of clomipramine treatment in 16 patients with TTM. Clomipramine was better than placebo, but the difference fell short of statistical significance [30].

### ***N-Acetylcysteine***

Several studies have analyzed the effect of N-acetylcysteine (NAC), a modulator of glutamic acid action, in TTM [31–33]. A total of 39 subjects aged 8–17 years with at least 6-month history of hair removal were included in a study performed by Bloch et al. [31]. Patients received NAC ( $n = 20$ ) or placebo ( $n = 19$ ) for 12 weeks. There was little improvement in either group. Significant reduction of hair pulling was only observed in 25% on NAC and 21% on placebo,

providing no evidence of any measurable benefits of NAC in children [31].

NAC was also evaluated in adult patients with TTM [32]. Fifty adults (45 women, 5 men) were enrolled into a double-blind, placebo-controlled trial and received placebo or 1200–1400 mg NAC per day for 12 weeks. The efficacy of the drug was assessed using the MGH-HPS. A total of 56% of patients with NAC improved “much” or “very much,” compared with 16% taking placebo ( $p = 0.03$ ) [32].

### ***Olanzapine***

Olanzapine belongs to the group of antipsychotic drugs and is used in schizophrenia and bipolar affective disorders, but has also been suggested for treatment of TTM [34]. In one study, 18 patients were subjected to a 3-month trial with olanzapine as monotherapy [35]. Patients with other coexisting psychiatric conditions were excluded. Dosage of 2.5 mg/day was gradually up-titrated to a maximum of 10 mg/day. Seventeen patients who completed at least 1 week of olanzapine treatment were evaluated. Hair pulling, as measured by the MGH-HPS, decreased by 66% from baseline ( $p < 0.01$ ), and mean scores on the Hamilton Rating Scale for Anxiety decreased by 63% ( $p < 0.05$ ). Scoring on the Clinical Global Impression (CGI) scale also revealed significant improvement as a whole ( $p < 0.01$ ), with four patients having complete remission of symptoms at the end of the study period [35].

In another trial, 25 patients received olanzapine in flexible doses [36]. Measurement of efficacy was performed using the CGI-Improvement (CGI-I) scale, and secondary measures of efficacy included the Yale–Brown Obsessive Compulsive Scale for TTM (TTM-YBOCS) and the CGI-Severity of Illness (CGI-S) scale. Eleven of 13 participants (85%) in the olanzapine group and 2 of 12 (17%) in the placebo group were considered responders according to the CGI-I ( $p = 0.01$ ). There was a significant change from baseline to endpoint on the TTM-YBOCS ( $p < 0.01$ ) and CGI-S ( $p < 0.01$ ) [36]. Based on these observations, olanzapine seemed to be an effective and safe drug for TTM, but further studies on larger patient populations are needed.

### **Naltrexone**

Naltrexone has been shown to be effective in TTM in some case reports [37, 38] and one open-label pilot study [40]. In an open-label fashion, De Sousa treated 14 patients (mean age  $9.0 \pm 1.88$  years) with childhood-onset TTM with naltrexone (mean dosage  $66.07 \pm 22.23$  mg/day) for 10 months. At the final visit, three (21.4%) children reported no hair pulling at all and a further eight (57.1%) showed improvement in hair pulling. Thus, overall positive response was found in 11 (78.6%) out of 14 treated children. The treatment was well tolerated with no adverse events reported during the study period [39]. However, these encouraging results were not confirmed by Grant et al. in a double-blind, placebo-controlled trial [40]. They randomized 51 patients with TTM (mean age  $32.7 \pm 9.8$  years) to naltrexone or placebo. All eligible subjects were started on naltrexone 50 mg/day or matching placebo for 2 weeks, then the dosage was increased to 100 mg/day, then again at week 4 to 150 mg/day for another 4 weeks (total duration of treatment 8 weeks). The therapy was well tolerated, and mild sedation was the only adverse effect reported statistically more frequently in those taking naltrexone. Unfortunately, naltrexone failed to demonstrate significantly greater reductions in hair pulling compared with placebo, as by the study endpoint nine (36%) of those assigned to naltrexone were “much” or “very much” improved compared with nine (34.6%) of those on placebo ( $p = 0.92$ ) [40]. Such discrepancies may be a result of different treatment duration (10 months versus 8 weeks) and different populations studied (children versus adults), but, definitely, the results are conflicting and further studies are needed to better define the true efficacy of naltrexone in TTM.

### **Other Therapies**

Cannabinoid agonists, such as dronabinol, have also been tested as therapy for TTM [41]. One 12-week study included 14 adult women. Patients received dronabinol at dosage of 2.2–15 mg/day. Efficacy was measured using the MGH-HPS. Twelve of 14 subjects (85.7%) completed the study. Nine (64.3%) subjects

were considered as “responders.” The mean effective dosage was  $11.6 \pm 4.1$  mg/day. The medication was generally well tolerated, with no significant deleterious effects on cognition [41].

Another group of drugs that has been tried in TTM are anticonvulsants such as topiramate. An open-label pilot study investigated the efficacy and safety of topiramate in 14 adults with TTM [43]. Patients received topiramate at dosage of 50–250 mg/day for 16 weeks. Measurements were performed using the MGH-HPS, CGI, Montgomery–Asberg Depression Rating Scale, Hamilton Rating Scale for Anxiety, and Disability Profile. CGI-Improvement scores suggested that hair pulling was not significantly reduced, although six of nine trial completers were classified as responders. None of the other measures showed significant differences compared with baseline. Five patients dropped out owing to adverse effects. These results indicate the presumed efficacy of topiramate in TTM therapy, but further trials in a larger patient population are needed to confirm these observations and better characterize its safety profile [42].

Modafinil, a stimulant used to treat narcolepsy, is another drug that has been tested to treat TTM. In one study, 18 adult patients received modafinil 200 mg/day or placebo in a double-blind design [43]. However, no benefits of modafinil have been documented in this group of patients (Table 1).

## **CONCLUSIONS**

We found few studies on treatment and diagnosis of TTM. Trichoscopy is a method that can be used to distinguish TTM from other types of hair loss. Most clinical trials testing the efficacy of various treatment options have been conducted on small groups of patients, and the benefits they found were determined using various scales, making it difficult to compare the effectiveness of different treatment methods. There is also a lack of research assessing treatment efficacy over longer periods of times. In most studies, use of pharmacotherapy was not more effective than placebo.

Significant benefits of treatment have mainly been observed in patients undergoing BT or cognitive behavioral therapy. Currently, cognitive behavioral therapy is the most empirically validated treatment for TTM, appearing to be more effective than pharmacological treatment.

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**Compliance with Ethics Guidelines.** This article is based on previously conducted studies and does not contain any studies with human participants or animals performed by any of the authors.

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