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From Hair-Pulling to Trichobezoars and Rapunzel Syndrome: A Comprehensive Review of Trichotillomania

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ABSTRACT

Introduction: Trichotillomania (TTM) is an obsessive-compulsive disorder characterized by the uncontrollable pulling of hair from various parts of the body, most commonly from the scalp, eyebrows, and eyelashes. Clinical manifestations of TTM include patchy alopecia, uneven hair shaft growth, and characteristic changes visible in trichoscopy, such as the presence of black dots, twisted hairs, split ends, and hairs shaped like exclamation marks.

The etiology of TTM is complex and involves genetic, neurological, and psychological factors. In some patients, TTM co-occurs with trichophagia, leading to the formation of trichobezoars in the gastrointestinal tract. In extreme cases, such as Rapunzel Syndrome, bezoars can lead to intestinal obstruction.

Treatment for TTM is multifaceted and includes both psychotherapeutic and pharmacological interventions.

Objective: The objective of this study is to provide a comprehensive review of trichotillomania (TTM), with a particular focus on its clinical symptoms, etiology, diagnostics, and treatment methods.

The aim is to understand this obsessive-compulsive disorder, its impact on patients' lives, and its connections to serious complications such as trichobezoars and Rapunzel Syndrome.

Materials and Methods: The study utilized analyses of scientific research, review articles, and reports concerning trichotillomania (TTM), trichobezoars, trichophagia, and Rapunzel Syndrome. It is primarily based on data from PubMed, Google Scholar, Cochrane Library, and studies published between 2000 and 2024, focusing on the diagnostics, etiology, and treatment of TTM and related disorders.

Conclusions: The purpose of this study is to provide a comprehensive review of the current knowledge on trichotillomania, including its clinical symptoms, etiology, diagnostics, and treatment methods, while considering serious complications such as trichobezoars and Rapunzel Syndrome.

Keywords: Trichotillomania, trichobezoar, trichophagia, alopecia, obsessive-compulsive disorders, stress, Rapunzel Syndrome, hair-pulling

INTRODUCTION

Trichotillomania (TTM) is classified among obsessive-compulsive disorders and involves the uncontrollable pulling of hair from various parts of the body (most commonly the scalp, eyebrows, and eyelashes, less frequently from the pubic area, arms, or face) [1]. Symptoms that may suggest TTM include areas of patchy alopecia where there is uneven hair shaft growth. Statistically, TTM occurs more frequently in women, who often deny or suppress this embarrassing problem [2]. In TTM, trichoscopy confirms hair loss and shows the presence of black dots, twisted or tangled hairs of irregular length, and split ends. The scalp may also exhibit hairs shaped like exclamation marks and yellow dots [3]. Hooked hairs or hairs shaped like question marks are partially twisted hairs that result from the contraction of remaining hairs attached to the scalp after pulling on the distal shaft. These are considered highly specific trichoscopic findings associated with trichotillomania [2]. Scalp biopsy may be helpful but is not necessary for diagnosis [4].

It is concerning that in patients who do not control their behavior in time and continue pulling out their hair, the changes can become irreversible, and the hair may never grow back. Additionally, some patients suffer from trichophagia, the swallowing of their own or others' hair, animal fur, or hairs found on combs or eyelashes [5]. This leads to the formation of trichobezoars in the gastrointestinal tract [1].

Trichophagia is a disorder in which patients swallow their own hair, but it can also involve the ingestion of others' hair, animal fur, or hairs found on combs, eyelashes, etc. [5]. The literature also describes "Rapunzel Syndrome"—a clinical condition where a hairball extends beyond the stomach along the duodenum to the small intestine, leading to obstruction [2].

In the course of this disorder, two mechanisms of hair-pulling can be distinguished: automatic (outside of consciousness) and goal-directed (conscious, responding to anger, sadness, or anxiety). Automatic hair-pulling is more common in younger children who admit to playing with their hair but do not remember pulling it out.

Adolescents and adults often engage in goal-directed hair-pulling in response to stressors. Interestingly, individuals often choose which hair to pull, seeking those with different textures, curls, or colors. Frequently, after pulling a hair, individuals examine and play with it, as well as chew, lick, or swallow it [2]. Triggers for hair-pulling may include sensory factors such as hair thickness, length, and location, and sensations on the scalp; emotional factors such as anxiety, boredom, tension, or anger; and cognitive factors such as thoughts about hair and appearance, rigid thinking patterns, and cognitive errors. Our observations indicate that most individuals experience a variety of triggers, and their dominance may change throughout the day [6].

The onset of TTM can occur at any point in life, but it is most commonly reported to begin during adolescence (ages 10–13) [1]. Clinical studies estimate the prevalence of this disorder in adults to range from 0.6% to 3% [7]. This disorder significantly impacts the quality of life and daily functioning of patients. 87% of patients with trichotillomania suffer from obsessive-compulsive disorders, 64% have mood disorders, 52% struggle with generalized anxiety disorder, and 44% experience skin-picking disorder as a comorbid condition [8]. The disorder was first described in 1889 by Hallopeau, a French dermatologist [7].

EPIDEMIOLOGY

The peak age of onset for trichotillomania is 12–13 years, with hair-pulling most commonly affecting the scalp and eyelashes/eyebrows [9]. From adolescence onwards, the prevalence of this disorder is estimated to reach up to 3.5%. Not all patients meet the precise criteria described in the DSM-V, but their symptoms align with a diagnosis of TTM. TTM occurs significantly more frequently in young women [4].

However, it is believed that these statistics are underestimated due to the infrequent reporting of patients seeking help from specialists.

ETIOLOGY

Trichotillomania is classified among obsessive-compulsive disorders (OCD), which are largely associated with anxiety disorders [4]. Individuals suffering from TTM often exhibit high levels of anxiety, depression, and low self-esteem. Many patients with trichotillomania report that a significant stressful event preceded the onset of hair-pulling behavior. Hair-pulling may serve as a coping mechanism for managing emotions.

In some cases, trichotillomania is also associated with past traumatic experiences. Adolescents may struggle with social or cultural pressures during puberty. Magnetic resonance imaging (MRI) studies have revealed structural changes in the gray matter of individuals with TTM, particularly in areas responsible for habit formation, learning, and cognition. Patients with TTM exhibit increased gray matter density in the left striatum, left amygdala-hippocampal complex, cingulate gyrus, supplementary motor cortex, and frontal cortex compared to a control group [9].

Positron emission tomography (PET) and single-photon emission computed tomography (SPECT) studies have shown increased glucose metabolism in the cerebellum and right parietal cortex, while SPECT studies have demonstrated reduced perfusion in the temporal lobes in individuals with TTM [4].

Additionally, drug-induced trichotillomania has been documented in patients with attention deficit hyperactivity disorder (ADHD) and in individuals abusing cocaine. It is reported as a rare side effect of stimulant medication used in the treatment of ADHD. Similarly, cocaine use can lead to hair-pulling behavior 30 minutes after smoking, which is not associated with tactile hallucinations or hidden skin disorders. In both cases of drug-induced trichotillomania, symptoms have been noted to resolve after discontinuing the medication [10].

TRICHOBEZOAR AND RAPUNZEL SYNDROME

The term "bezoar" originates from the Arabic word "bedzehr" and the Persian word "padzhar" [11]. A bezoar is a compact mass composed of foreign, indigestible, or indigestible material that accumulates in the folds of the gastric mucosa. It may be confined to this area or extend into the lumen of the small intestine, sometimes causing obstruction—known as Rapunzel Syndrome (Haggui et al., 2022). This syndrome, named after the long-haired girl from the fairy tale written by the Brothers Grimm in 1812, was first reported in two cases by Vaughan and colleagues in 1968 [12]. Since then, approximately 110 cases of this syndrome have been reported [13]. The most common complications include iron deficiency anemia, gastric or intestinal outlet obstruction, and external bleeding [14].

Pica is an eating disorder often associated with Rapunzel Syndrome. It involves a persistent craving for and consumption of non-food items, such as hair, wool, flax, or metals, leading to severe complications [15].

Diagnosing trichobezoars is challenging as clinical symptoms often appear late. Most patients are asymptomatic in the early stages of the disease. Trichobezoars covered with gastric mucus appear shiny, while stomach acid denatures the protein in the hair, giving the bezoar a dark color. Due to the decomposition and fermentation of hair, patients may experience foul breath and, occasionally, halitosis [16].

Symptoms arise as the trichobezoar grows. Diagnosis often begins when acute gastrointestinal symptoms such as nausea, vomiting (including bloody), weight loss (to anorexia), and constipation occur. On physical examination, a mass in the left upper abdomen may be felt as a mobile, limited tumor [17]. Cholestatic jaundice and acute pancreatitis may also occur [18]. For a patient with known TTM and a palpable mass in the abdomen, endoscopy should be planned for diagnosis or treatment following a careful abdominal ultrasound. Ultrasound can reveal whether the bezoar mass is mobile and does not invade the wall, distinguishing it from a tumor mass [19].

Trichophagia can also lead to the formation of trichobezoars without the presence of trichotillomania [12]. The importance of a thorough medical history cannot be overlooked, as it helps identify the problem of hair ingestion by the patient (trichophagia). Typical radiographic findings include a large area of filling defect within the lumen with mottled translucency and detection of shadowing masses in ultrasound examination [21].

CT scans are also used for diagnosing TTM (bezoars appear as round masses with air bubbles), with definitive confirmation provided by endoscopy. During this procedure, a sample can be taken for histopathological examination to determine the origin of the bezoar [22].

Bezoars can be classified based on their composition, including phytobezoars (plant residues such as fruit and vegetable remnants), trichobezoars (hair), pharmacobezoars (medications), and lactobezoars (milk proteins) [23]. Lithobezoars (accumulated stones) and plasticobezoars (plastic material) have also been described [17]. Trichobezoars have been found to develop secondarily in 38% of patients with trichotillomania [23].

Bezoar removal is performed using endoscopy, laparoscopy, or, in the most severe cases, laparotomy. Hair-derived bezoars cannot be dissolved, whereas dissolution is an effective method for removing plant-based bezoars, such as with acetylcysteine, phosphoric acid, and Coca-Cola [21].

Special attention should be given to patient comfort and providing appropriate psychiatric support after trichobezoar treatment. Otherwise, the embarrassment and stress associated with the situation increase the likelihood of trichobezoar recurrence [24].

DIFFERENTIAL DIAGNOSIS

Alopecia Areata is an autoimmune form of hair loss that causes non-scarring hair loss due to an autoimmune attack on hair follicles. It typically presents as round patches of hair loss on the scalp. The lifetime prevalence of alopecia areata is estimated to be 1.7–2.1% [25].

Androgenetic Alopecia is the most common form of hair loss worldwide, characterized by progressive hair loss that begins after puberty. Its prevalence increases with age and is marked by gradual thinning of hair in the crown and frontal areas of the scalp. It differs between men and women due to variations in androgen receptor distribution, and commonly involves receding hairlines. The mechanism of the condition is related to excessive response to androgens [26].

Hair loss can also be secondary to various other causes, including hypothyroidism, chemotherapy, secondary syphilis, leprosy, and frontal fibrosing alopecia [27].

TREATMENT METHODS FOR TRICHOTILLOMANIA

Non-Pharmacological Treatments

Trichotillomania (TTM) treatment is multifaceted, involving both psychotherapy and pharmacotherapy, especially in adult patients.

Cognitive Behavioral Therapy (CBT) is a key non-pharmacological approach, incorporating various techniques to help patients identify and change negative habits and thoughts related to hair-pulling [2]. Habit Reversal Training (HRT), a component of CBT, requires significant effort at the start. During HRT, patients must carefully observe themselves to become aware of the situations triggering hair-pulling. They receive praise for recognizing these triggers and are guided to perform a competing response, such as squeezing a stress ball, instead of pulling hair. Social support from family members is also crucial, reminding patients to use the training [4]. Dermatological procedures such as **microneedling** can also be used. This involves creating micro-injuries in the skin using medical needles to stimulate healing and angiogenesis. Patients use a dermaroller with needles (0.5mm) to create a sensation similar to hair-pulling, which can reduce the urge to pull and stimulate hair growth [28].

PHARMACOLOGICAL TREATMENTS

Selective Serotonin Reuptake Inhibitors (SSRIs) and **Tricyclic Antidepressants (TCAs)**, particularly clomipramine, are first-line pharmacological treatments for TTM. Recently, there has been increasing interest in **N-acetylcysteine (NAC)** and **cannabinoid agonists** for treating body-focused repetitive behaviors (BFRBs) [29].

Currently, no medications are specifically approved for TTM. The aforementioned drug groups help manage symptoms likely by addressing co-occurring psychiatric conditions, such as depression, rather than treating TTM directly.

There are no significant differences in reducing hair-pulling frequency, duration, or amount between patients taking SSRIs and those on placebo. SSRIs are effective for treating co-occurring disorders with TTM, which is why they are commonly included in treatment regimens. Dosages of **olanzapine** (2.5–10 mg/day) have shown considerable effectiveness in treating TTM, but the drug has potential side effects such as metabolic disorders and extrapyramidal symptoms, which should be considered [2].

Clomipramine (TCA) blocks the reuptake of norepinephrine and serotonin, and also inhibits muscarinic, adrenergic, H1, and 5HT2 receptors. The effective dose in monotherapy is 125 mg/day, while in combination therapy, it is used at 50 mg/day with behavioral therapy. Its common side effects include dry mouth, constipation, drowsiness, and sedation [2].

In a study with 13 women, clomipramine was compared with desipramine in a double-blind trial for 10 weeks. Clomipramine resulted in greater improvement, with patients reporting reduced hair-pulling. Another study found clomipramine to be superior to placebo, though the difference was not statistically significant [30].

N-acetylcysteine (NAC) acts as a modulator of glutamate activity and is available over-the-counter in many countries. It is widely used for respiratory diseases and detoxification. NAC has shown safety and good tolerance [31]. A case study showed NAC to be beneficial in supporting TTM treatment when combined with bupropion and fluvoxamine. However, a study by Bloch and colleagues found no significant improvement in hair-pulling with NAC compared to placebo over 12 weeks [32].

Cannabinoid Agonists, such as **dronabinol**, administered in doses of 2.2-15 mg/day, have been well-tolerated and helped patients with TTM, with 63.4% of participants responding positively to the treatment without adverse cognitive effects [33].

Currently, no specific medications are approved for TTM, and treatments mainly focus on alleviating co-occurring disorders. Treatment selection should be tailored to the individual's needs, incorporating both non-pharmacological and pharmacological approaches. Documentation through photography can aid in monitoring treatment progress.

SUMMARY

Trichotillomania is a chronic disorder that can lead to significant psychosocial issues and, in rare cases, life-threatening medical complications. Effective management of hair-pulling is crucial for long-term health and quality of life.

Recommended treatment strategies include thorough psychiatric evaluation, particularly when co-occurring disorders are present; medical evaluation if the patient has ingested hair; education about the disorder; habit reversal training; consideration of pharmacotherapy; and attention to overall quality of life and long-term functioning.

Author's contribution

Conceptualization, KR; methodology, MK, JNL, EJJ; software, OB, MK, JNL, EJJ, MN; check, AP, MR, MN; formal analysis MR, OB, MK; investigation, JNL, AP; resources, MN, KR; data curation, MR, AP ; writing – rough preparation OB, MK; writing-review and editing, JNL,MR, EJJ.; visualization MN; supervision, KR,OB; project administration, JNL, MK;

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