

Telogen Effluvium With Dysesthesia (TED) Has Lower B12 Levels and May Respond to B12 Supplementation

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INTRODUCTION

We investigated a subtype of Telogen Effluvium associated with Dysesthesia, (TED) which was defined as the presence of Telogen Effluvium with severe itch, pain, soreness, burning, or formication in the absence of any inflammatory scalp disorder or medication associated with Telogen Effluvium or Dysesthesia. These are patients who present with a “burning” scalp or other dysesthesia associated with increased telogen hair shedding. Telogen Effluvium is not typically associated with any scalp symptoms.³ Other scalp dysesthesia studies have mentioned occasional patients in their study that were also diagnosed with Telogen Effluvium,^{1,2} but the clinical association of Scalp Dysesthesia and Telogen Effluvium has never been made as a distinct entity.

OBJECTIVES

We describe a subtype of Telogen Effluvium, Telogen Effluvium with Dysesthesia (TED), and describe diagnostic parameters to identify the disease (see Table 1). We also evaluated B12 levels in patients diagnosed with TED and compared these results to patients diagnosed with Telogen Effluvium (without dysesthesia). We then evaluated a second, separate group of 10 new patients diagnosed with TED after B12 treatment.

METHODS

In this retrospective chart review, we identified patients who complained of significant hair loss and shedding and who also complained of a significant dysesthesia that occurred along with the shedding. A control group of randomly chosen patients with Telogen Effluvium without dysesthesia was also reviewed. All patients had a positive pull test. These results were then statistically evaluated and compared for significance. Patients with TED were evaluated for B12 levels with laboratory tests obtained on the initial visits from January 2013 to September 2016. All patients were evaluated at Garden City Dermatology, a suburban Dermatology practice with an interest in diseases of the hair, located in Garden City, Long Island, NY. All patients from January 2013 through September 2016 with an initial diagnosis of Telogen Effluvium who also complained of scalp dysesthesia were included. Dysesthesia was defined as severe itch, pain, soreness, burning, or formication that occurred in close proximity (immediately prior to), or during, the hair loss (see Table 2). We retrospectively reviewed the patient charts of TED patients for B12 levels to determine if there were any significant

abnormalities and compared our findings with a control group of patients diagnosed with only Telogen Effluvium. The control group was randomly chosen from a computer-generated list of patients who were diagnosed with Telogen Effluvium but did not have dysesthesia.

We then took a second group of 10 new patients who were diagnosed with TED and prospectively tested for B12. We then treated them with B12 and evaluated the efficacy of this treatment.

Data Sources

Vitamin B12 levels were evaluated by the lower limit of normal as well as the testing laboratory equivocal levels of 200-400 pg/mL where these levels may be inadequate and cause symptomatology of B12 deficiency. The B-12 laboratory values were then also evaluated for levels below 550 pg/mL, which is a limit that is used in other countries.⁴ The data was then subdivided into multiple levels for evaluation (see figure 1).

Laboratory results were obtained from federally approved commercial laboratories. The TED group and the TE control group were evaluated to determine if the groups were comparable by sex, age race or duration of hair loss (see Table 3). The sample size consisted of forty-five TED cases that were tallied over a 3-year period. All patients had laboratory testing done. An identical number (45) of control Telogen Effluvium patients (without dysesthesia) was used as a comparison for our experimental TED group. In total, we examined 90 patient's lab results plus an additional 10 patients with TED who were evaluated for treatment response to B12.

TABLE 1.

Diagnostic Parameters to Identify TED.

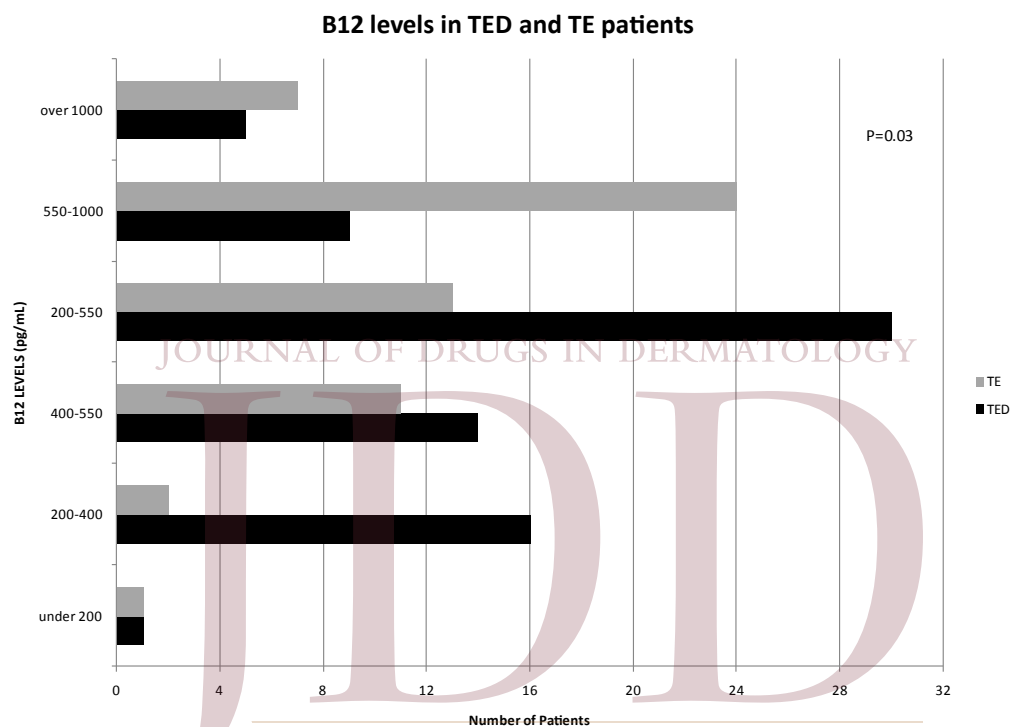
Diagnostic Criteria for TED

1-Diagnosis of Telogen Effluvium

2-Diagnosis of Scalp Dysesthesia

3-Dysesthesia Symptom occurring in proximity to or during the Telogen Effluvium

4-Absence of any concurrent scalp inflammatory disorder or medication responsible for the dysesthesia or Telogen Effluvium

FIGURE 1. Graph of B12 levels in each group. Significant differences ($P=0.03$) between the TED and the TE control group were evident.

Quantitative Variables

All eligible patients had labs drawn at their initial visit. The diagnostic criteria for both groups for Telogen Effluvium included excessive hair shedding with a positive pull test and no associated scalp contact dermatitis, suspect medication use or any other apparent source of shedding. Scalp dysesthesia was defined as burning, soreness, formication, severe itch or pain at any time during, or prior to, the hair shedding that was a significant independent complaint and that occurred for at least one month. The intensity, duration, and frequency of the dysesthesia was variable among the 45 TED patients (see Table 2). Most patients complained that the dysesthesia occurred along with their hair loss, not before or after, and that the intensity of the pain waxed and waned. One patient stated that the pain she experienced was similar to the pain of “ripping a band-aid off.” Another patient stated that the pain she experienced was as if she had banged her head. Many patients specifically complained of a pain similar to having their hair tied back in a pony tail for an extended period of time.

RESULTS

The Vitamin B12 laboratory results from each group were compared with a two tailed t-test. B12 levels were further analyzed after the initial data showed significance. Levels below 200, 200-400, 400-550, 200-550, 550-1000, over 1000 were then compared in each group (see figure 1). Matching of cases and controls was addressed by evaluating the age of onset, sex, and duration (see table 3). Patients were diagnosed with TED

and then recorded onto a TED list over three years. The control group was randomly selected from a computer-generated list of patients with Telogen Effluvium without dysesthesia who had completed lab tests including a B12 level.

A second group of ten new TED patients were prospectively evaluated for B12 levels (see Table 4), and treated with B12 injections (1000 mcg SQ or IM every month for four months) as well as oral B12 (2 mg PO QD). After B12 treatment, 10/10 patients had decreased or absent shedding, and 9/10 patients reported decreased or absent dysesthesia.

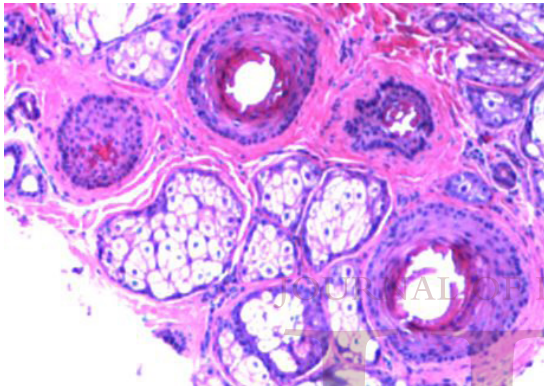
Histopathology: Two biopsy specimens of TED were evaluated. The histopathology showed telogen hairs with slight perifollicular inflammation. Some pigment incontinence was noted within the bulb in one specimen. Both specimens showed pa-

TABLE 2.

Dysesthesia Complaint by Symptom Type (Some TED Patients exhibited multiple symptoms.)

| Type of Dysesthesia complaint | Number of TED patients |
|----------------------------------|------------------------|
| Severe Itch | 37 |
| Burning | 24 |
| Soreness /pain | 18 |
| Formication (crawling sensation) | 6 |

FIGURE 2. Microscopic section of follicular unit with two telogen and two anagen follicles at the level of the isthmus. Original magnification X100.



thology consistent with Telogen Effluvium without any other specific abnormalities (see figures 2 and 3).

DISCUSSION

This study describes diagnostic criteria for Telogen Effluvium with Dysesthesia (TED) and outlines the diagnostic criteria. It also identifies that a lower (less than 550 pg/mL) level of B12 is associated with 69% of TED patients vs 31% of TE.

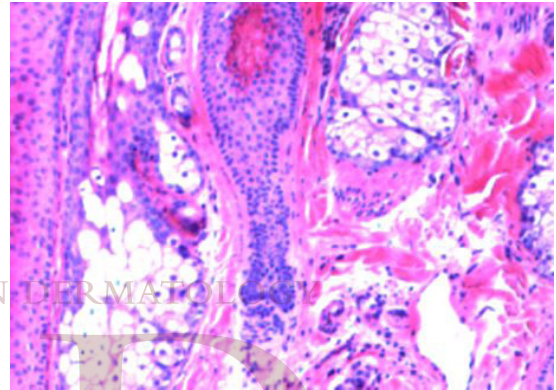
Vitamin B12 is critical in a functional central nervous system. Individual metabolic requirements for B12 vary and even with "normal levels" disease may occur. Neurologic symptoms of B12 deficiency often present before any hematological abnormalities.^{11,22}

The lower limit of Vitamin B12 in Japan and some countries in Europe ranges from 500-550 pg/mL, which was determined by neurological criteria.⁴

Another study also used a 550 pg/mL cut-off point in evaluating Vitamin B12 levels.¹⁰ B12 levels between 200-400 pg/mL, although within normal limits, are associated with neuropsychiatric and hematologic disorders.^{5,6}

These patients often describe stress and anxiety,²¹ which can be associated with suboptimal Vitamin B12 levels. The associated stress and anxiety and/or the dysesthesia and/or the hair loss may be exacerbated by, or due to, the lower B12 levels. Of the 10 new TED patients we evaluated, 10 patients had decreased or absent shedding after B12 treatment and 9 patients reported decreased or absent dysesthesia after B12 treatment. Our small group of ten patients shows a very promising result for B12 supplementation in both TE and Dysesthesia in TED. It is also clear this is a small sample size and a significant result if further investigation of this treatment modality supports these results. Further research is needed.

FIGURE 3. Microscopic section of an early telogen/late catagen follicle. Hair papilla forms a small cluster of cells under the secondary germ unit. Original magnification X100.



This is the first report of patients with TED. A limitation of our study is our small sample size. A larger number of patients with TED would be desirable to enhance the power of the statistical evaluation and to eliminate any bias. The number of patients with B12 levels under 550 pg/mL in the TED group were more than double the control group. We also note that 31% of the TED group had a B12 level above 550 pg/mL. This may be due to patients having a prior deficiency and then were sampled when their B12 returned to normal. This also may be TED without a B12 deficiency, or an inability to process the B12 present. Further research is needed. Regardless, it is clear that a B12 level is reasonable to obtain in patients with TED.

A recent study⁹ found normal levels of B12 in 115 patients with Telogen Effluvium without any associated dysesthesia, as we also essentially found in our Telogen Effluvium (without dysesthesia) data. These results support a role for B12 in the evaluation and treatment of patients with TED. The effects of a lower B12, even below 550 pg/mL, may be associated with the dysesthesia and/or the telogen hair loss, or may be associated with other pathogenic mechanisms. There have been many reports that question the lower limit of Vitamin B12 in the United States.^{4,12-14,16} The lower limit in the United States is based on the hematological deficiency, but not the neurological deficiency.^{13,16} Clearly, neurological function is involved in both dysesthesia and hair growth. Measuring for hematologic abnormalities in B12 deficiency in TED is not helpful as all MCV levels were normal. The neurological function B12 threshold appears to be most important in evaluating TED.

A neurological dysfunction or psychiatric disorder has been suggested as an explanation for the Scalp Dysesthesia,^{1,15,17} and, in patients with diffuse hair loss, may be a cause of the painful sensations.^{15,18} Another study hypothesized that Scalp Dysesthesia is due to Cervical Spine Disease rather than psychiatric causes.² Multiple studies have found a normal serum level of

B12 in patients exhibiting psychiatric symptoms, but also found a deficient cerebrospinal fluid level of B12.¹⁹⁻²¹ Mitsuyama⁷ reported that in demented patients CSF-B12 levels were low, even when serum B12 levels were between 500-1300 pg/mL. It has also been suggested that disturbances in the group C nerve fibers may be the cause of the scalp dysesthesia, as the sensations of both pain and itch are carried on these nerve fibers.^{1,18} Psychiatric manifestations may be the first symptoms of spinal degeneration and vitamin B12 deficiency.²¹

Evaluating methylmalonic acid and homocysteine levels is a consideration in the evaluation of B12 deficiency. If these levels are elevated in the presence of a "normal" B12 level, it indicates impaired function of holo-transcobalamin, the active form of vitamin B12, and this may have affected the nine patients in the TED group with B12 levels above 550 pg/mL. Decreased B12 function may also be seen in patients with certain MTHFR gene mutations and further evaluation may be necessary.

The results of this study suggest that laboratory evaluation of B12 levels should be done in all patients with TED and supplementation with B12 is recommended to reverse the lower levels and minimize or eliminate the Telogen Effluvium, as well as the associated Dysesthesia, seen in TED.

Supplementation with B12 injections and/or orally is recommended, especially in patients with a level below 550 pg/mL.

DISCLOSURES

The authors have no conflict of interest to declare. This study was entirely funded by Garden City Dermatology.

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TABLE 3.

Comparison of patient variables in TED vs TE (CTE= Chronic Telogen Effluvium, ATE=Acute Telogen Effluvium, TE=Telogen Effluvium)

| | TED | TE |
|-------------------|---|---|
| Mean Age of Onset | 49.76 years | 50.86 years |
| Race | 42 Caucasian 1 Hispanic/Latino 1 African-American 1 Declined to identify | 40 Caucasian 2 Hispanic/Latino 3 Declined to identify |
| Sex | 44 female, 1 male | 45 female |
| Duration of TE | 42 CTE(> 6 months) 3 ATE(< 6 months) | 42 CTE(> 6 months) 3 ATE(< 6 months) |

TABLE 4.

Additional TED patients B12 levels (mean= 408.3 pg/mL) prior to B12 treatment. All patients had decreased or absent shedding, and 9/10 patients reported decreased or absent dysesthesia.

| Patient # | B-12 level (pg/mL) |
|-----------|--------------------|
| 1 | 315 |
| 2 | 323 |
| 3 | 357 |
| 4 | 373 |
| 5 | 381 |
| 6 | 387 |
| 7 | 393 |
| 8 | 434 |
| 9 | 480 |
| 10 | 640 |

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