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Goeckerman Therapy for the Treatment of Eczema: A Practical Guide and Review of Efficacy

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Abstract

The Goeckerman regimen, consisting of the application of crude coal tar combined with exposure to ultraviolet radiation, was formulated in 1925 for the treatment of psoriasis. While some centers have adapted the Goeckerman regimen for the treatment of eczema, there are no published reports of its efficacy in this condition. Here, we explain how the Goeckerman regimen has been modified for use in an eczema population at the University of California San Francisco (UCSF). We reviewed the treatment records of eczema patients treated with the modified Goeckerman regimen over a 6 year period at UCSF. We found that the Goeckerman regimen was effective in treating patients with severe baseline disease, inducing a mean remission period of 7.2 months. The treatment was tolerated well with mild folliculitis and occasional UVB phototoxicity noted as the only adverse reactions. Since the use of Goeckerman as a treatment for severe eczema is both effective and safe, it should be considered an excellent alternative or adjunct to the systemic therapies currently being used.

Keywords

Goeckerman; Crude Coal Tar; Phototherapy; Eczema

Introduction

The Goeckerman treatment, consisting of the application of crude coal tar combined with exposure to ultraviolet radiation, was formulated in 1925 for the treatment of psoriasis. While the treatment has previously been demonstrated to be an effective therapy for psoriasis [1], to our knowledge there are currently no published studies detailing the treatment's efficacy in eczema. This is despite the established use of the Goeckerman therapy for the treatment of eczema at several centers around the world [2, 3]. Here, we explain how the Goeckerman regimen has been modified for use in an eczema population at the University of California San Francisco (UCSF). For eczema patients treated between

2004 and 2010, we review the baseline characteristics of the treatment population and describe the efficacy of the Goeckerman regimen modified for this group.

Goeckerman Regimen for Eczema at UCSF

1. Prior to therapy, a complete history and physical is performed on each patient, including documentation of all prior and current medications. The patient's assessment of itch severity and sleep quality is also noted.
2. Patients are treated five days a week, Monday through Friday, for 4–6 hours a day (See Figure 1).
3. An initial assessment is made as to whether patients display widespread or intense erythema. If so, patients are first “cooled down” for 3–7 days with topical application of corticosteroids to the affected areas. We typically use triamcinolone 0.1% ointment to the trunk and extremities, desonide 0.05% cream or ointment to the face, axillae, and groin, and fluocinolone 0.01% oil (Derma-smoothe/FS®) or triamcinolone 0.1% lotion to the scalp. Clobetasol ointment is used for areas of severe dermatitis. Occlusion of topical steroids is performed using plastic wrap to the trunk and extremities, impermeable gloves and socks for the hands and feet, and a shower cap for the scalp.
4. After the cool down procedure (if needed), phototherapy in the form of broadband UVB (most commonly) or narrowband UVB is given each morning of treatment prior to the application of topicals. The initial phototherapy dose for broadband UVB (20–40 mJ/cm²) is given according to the Fitzpatrick skin type and slowly titrated upwards (usually by 40 mJ/cm²) on subsequent days. Starting doses and change increments vary between broadband and narrowband UVB.
5. Next, tar in the form of 2% crude coal tar (CCT) compounded in petrolatum is added to the regimen. This is applied after phototherapy in the morning. Patients are also given 20% liquor carbonis detergens (LCD) to be applied at night before bed at home. Although most CCT and LCD is compounded in aquaphor (petrolatum based ointment containing mineral oil and lanolin alcohol), many patients with eczema or atopic dermatitis cannot tolerate the base due to its wool alcohol content. Therefore, for these patients, the tar can be compounded in a non-ionic base (NIB), usually Cetaphil cream – a water based moisturizer.
6. Each day, an assessment is made as to patient's skin symptoms. A burning sensation after the previous UV light treatment may indicate sensitivity to phototherapy, in which case the light is decreased in dose for that day or omitted. Skin irritation may be a sign of sensitivity to the tar, in which case the tar is decreased in concentration or stopped. If no adverse symptoms are noted, the dose of phototherapy may be increased daily, and the strength of tar increased from 2% crude coal tar to 5% crude coal tar.
7. Adjunct evening treatments to be used include oral antihistamines.

Methods

We reviewed the medical treatment records of all eczema patients receiving Goeckerman treatment at UCSF from April 12, 2004 to May 21, 2010. Each patient's treatment details were collected from the admission note, daily progress notes, and discharge forms. The information collected included: demographics, past treatment history, concurrent medications, medications used as part of the daily Goeckerman regimen, and home treatments (considered “Adjunct Treatment”). The discharge forms contained a final

assessment of the patient's improvement over the course of the admission. The percent clearance was recorded and a score was given for the amount of pruritus [from 0 (none) to 3 (severe)] and erythema [from 0 (none) to 4 (very severe)] at discharge.

Results

The demographic characteristics of the eczema patients receiving Goeckerman treatment are shown in Table 1. Fifty-six patients completed Goeckerman treatment during a six-year period. Patients were slightly more often male than female. The most common ethnicities were Caucasian and Asian, largely reflecting the population within the San Francisco Bay area. Patients ranged in age from 5 to 96 years, but in general the patients were middle-aged and over half had their onset of eczema after the age of 18.

Greater than 80% of the eczema patients treated with Goeckerman had previously received either phototherapy or a systemic medication such as oral corticosteroids, cyclosporine, methotrexate, or azathioprine (Table 2). One quarter of the patients had previously received Goeckerman therapy.

With regard to the Goeckerman regimen which is adapted for individual patients, all patients (100%) received and tolerated crude coal tar therapy ("black" tar as opposed to LCD or other diluted forms of tar) (Table 3). Nearly all patients concomitantly received topical corticosteroids (88%) and phototherapy (93%), whereas very few patients received calcineurin inhibitors or keratolytics. The mean length of treatment for the first Goeckerman admission was 24 treatment days, which corresponded to 38 calendar days (Table 4). For patients who returned to the clinic for a second Goeckerman admission, the mean treatment length was 15 days. Participation in a third Goeckerman admission resulted in a further decrease of mean treatment to 11 days. The mean remission period (time between the first and second admission) was just over 7 months and ranged from 17 days to 1.6 years (Table 5).

The Goeckerman regimen for eczema resulted in significant clinical improvement, with greater than 90% skin clearance and very low erythema and pruritis scores. The patients did not demonstrate tachyphylaxis to the treatment as it remained effective during their second and third admission (Table 6). Although the exact percentage was not documented, mild folliculitis and UVB induced phototoxicity were the only adverse events noted in our population.

Discussion

Our review indicates that eczema patients with severe baseline disease benefit greatly from Goeckerman treatment. Overall, there was outstanding efficacy with 44/55 (80%) of patients achieving at least 90% clearance of clinical signs and symptoms of disease. This clearance rate for eczema is slightly less than the Goeckerman clearance rate for psoriasis, which has been reported as 100% for patients achieving a PASI 75 (75% improvement in Psoriasis Area and Severity Index score) in one study [4] and 100% for psoriasis patients clearing by greater than 90% in another study [5]. The mean length of remission for eczema patients treated with Goeckerman was 7.2 months, which is quite good for this refractory population. In comparison, the use of the Goeckerman regimen for psoriasis has been reported to result in remission times ranging from 9.5 months [1] to over a year [5]. In our cohort, there was no sign of patients becoming resistant to the Goeckerman treatment. In fact, repeat admissions required fewer treatment days than first admissions and still achieved an average of greater than 80% clearance.

Tar and phototherapy together are known to be synergistic in action, which was first described by Dr. WH Goeckerman in his initial description of the Goeckerman procedure [6]. According to him, tar is a photosensitizer which when combined with UVB light produces efficacy greater than either treatment alone. Further studies have confirmed that tar plus UVB is more effective than either therapy alone [7–9]. This is also supported by our study, since many of our patients had used phototherapy in the past (57.1%) with inadequate results. However, when these same patients used a combination of UVB and tar, we were able to clear their disease.

Enhancing the Goeckerman treatment by combining with other treatments options in adjunct is not uncommon and can be considered “modern” Goeckerman therapy [4, 10]. In this retrospective review, it is clear that, similar to the “modern” Goeckerman used for psoriasis, the regimen used to treat eczema includes additional therapies to complement the standard black tar and UVB. Topical steroids were used in almost 90% of cases. Two-thirds of the group was on oral antihistamines during treatment and almost 25% were receiving therapeutic emollient baths. For 10% of patients Goeckerman was in adjunct to systemic agents.

The safety profile of the Goeckerman therapy in our study appeared to be excellent, with no adverse effects reported other than mild folliculitis and occasional UVB phototoxicity. Although there may be a theoretical concern for side effects such as skin atrophy with topical steroids used under occlusion or concern for malignancy when using cyclosporine and UVB in combination, no such effects have been seen in our experience. Patients only use topical steroids under occlusion for a short period (3–7 days) if “cool down” is required and no patients are continued on cyclosporine for greater than 2 years—the threshold at which an increased incidence of non-melanoma skin cancers is noted [11]. In addition, secondary to the intense treatment regimen, patients are closely monitored and examined daily.

There have been concerns in the safety of coal tar because it contains several carcinogenic compounds. However, Roelofzen et al. demonstrated in a review of 13,200 patients that there was no increased risk of cancer with the use of coal tar compared with corticosteroids in psoriasis and eczema patients [3]. Additionally, two large 25-year follow-up studies performed at the Mayo Clinic showed no significant increase in cancer incidences in psoriasis and eczema patients treated with Goeckerman compared to the general population [2, 12]. Lastly, an FDA review of the carcinogenicity issue of therapeutic tar in 2001 revealed no evidence that therapeutic tar is linked to increased risk of cancer [8]. In our retrospective study the Goeckerman treatment was well tolerated by most patients. Other treatments for severe eczema have potential adverse side effects. For instance, cyclosporine can cause nephrotoxicity and methotrexate is hepatotoxic and teratogenic. Since the use of Goeckerman as a treatment for severe eczema is both effective and safe it should be considered an excellent alternative or adjunct to the systemic therapies currently being used.

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Time	Regimen
8:00AM – 9:00AM	Arrival at center; whole body UVB treatment in UVB box
9:00AM	Application of topical steroids if patient is being “cooled down” or up to 5% crude coal tar followed by occlusion with plastic wrap. Patients stay coated in corticosteroids or tar until afternoon (minimum 4 hours)
10:00AM – 11:00AM	Staff conducted patient education, group discussion, or relaxation therapy
11:00AM – 12:00PM	Rounds with attending physician
12:00PM – 1:00PM	Lunch (brought in by patients) – kitchen provided
3:00PM	Wash off tar with mineral oil, soap, and water, followed by whole body application of 20% LCD
Bedtime at home	One more application of 20% LCD

Figure 1.
Typical Goeckerman Daily Schedule at UCSF

Table 1**Patient Demographics**

Number of Patients	56
Mean Age (S.D.)	54 (22)
Age Range	5 – 96
Mean Age of Onset (S.D.)	33 (31)
Age of Onset >18	53.6%
Male Gender	66.1%
Ethnicity of Patients	
Caucasian	33.9%
Hispanic	3.6%
Asian/Pacific Islander	37.5%
African American	5.4%
Not Available	17.9%

Table 2

Severity of Eczema

Percent of patients previously treated with:	
Phototherapy	57.1%
Systemic Steroids	55.4%
Goeckerman	25.0%
Cyclosporine	7.1%
Methotrexate	7.1%
Azathioprine	3.6%
Received at least one of the above treatments	83.9%

Table 3

Treatment Regimen (on first admission)

Goeckerman Regimen Treatment	
Phototherapy	92.9%
Tar	100.0%
Topical Steroid	87.5%
Keratolytics	1.8%
Calcineurin Inhibitors	5.4%
Emollient Bath	23.2%
Adjunct Treatment	
Home Tar (20% LCD)	26.8%
Home Topical Steroid	64.3%
Systemic Steroids	10.7%
Non-Steroidal Systemic Agents	10.7%
Home Calcineurin Inhibitors	3.6%
Oral Antihistamines	66.1%

Table 4

Length of Treatment

	Admission 1	Admission 2	Admission 3
Number of Patients	56	12	5
Mean Treatment Days (S.D.)	24 (9)	15 (9)	11 (3)
Mean Calendar Days (S.D.)	38 (14)	30 (18)	22 (17)

Table 5

Remission Period

Mean Days between Admission 1 and 2	220 (148)	Range	17 days – 1.6 years
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Table 6

Patient Improvement

	Admission 1	Admission 2	Admission 3
Mean Percent Clearance (SD)	91 (9)	83 (19)	83 (12)
Mean Post-Treatment Erythema Score (SD) (0=None, 4=Very Severe)	0.28 (0.45)	0.30 (0.48)	0.00 (0)
Mean Post-Treatment Pruritus Score (SD) (0=None, 3=Severe)	0.78 (0.57)	0.90 (0.74)	1.00 (0)