Single lesion cutaneous leishmaniasis in children - an effective, simple home based treatment: a preliminary report

H S Sudusinghe[1], T D Weerasinghe[2], J K K Seneviratne[3]

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Abstract

Cutaneous leishmaniasis is an established vector borne disease in Sri Lanka. The use of different treatment modalities indicates lack of an effective monotherapy. The available treatment options are either painful, expensive or both.

Heat therapy has been used as an effective method of treatment for cutaneous leishmaniasis since 1950[4]. This is based on the fact that optimum temperature of the parasite is around 26°C[15]. Different heat delivery mechanisms have been practiced in the past. The device currently used is the Thermomade[1,2].

We have encountered a number of practical difficulties in carrying out current treatment in children. This study aims to determine efficacy of a novel, simple, house-hold method of local heat therapy in treating single lesion cutaneous leishmaniasis.

A total of 19 smear positive patients were included in the study. However, only 15 were enrolled as 4 patients were lost to follow up. All patients were treated at home by a trained parent. Treating included the method of heat delivery using a metal spoon. Clinical improvement was assessed using digital photographs by principal investigator. Efficacy of intervention was assessed by using a simple scoring system. A repeat smear was performed when necessary.

Twelve patients out of 15 had a dramatic response, achieving complete clinical clearance within two months of initiation of therapy and had no recurrence 6 months later. Another two responded to 6 months therapy and recurrence was not noted in subsequent follow up.

Introduction

Since 1930, pentavalent antimonial compounds have remained the mainstay of treatment of cutaneous leishmaniasis. However these compounds are known to cause various adverse effects and are expensive. As a vial costs 100 US dollars this is an expensive mode of therapy. Other treatment options available include amphotericin B, miltefosine, pentamidine and antibiotics such as dapsone. Local therapies include cryotherapy, heat therapy and topical or intralesional stibogluconate.

Heat therapy has been used as an effective method of treatment for cutaneous leishmaniasis since 1950. In the past, heat had been delivered locally using hot water[13] and by bacteria[4]. Over the years attempts have been made to develop rational therapeutic techniques to deliver local heat therapy. Thermomade was one successful innovation and number of studies have shown its effectiveness with a cure rate of 70-90%. However these expensive and sophisticated instruments can only be used in hospitals and clinics. Based on available scientific data heat therapy is safe and effective. Few reported transient adverse effects are pain, erythema, burns and bacterial infections.

We have encountered a number of practical difficulties in administering local therapies such as cryotherapy and intralesional sodium stibogluconate. Associated pain, and uncooperative fearful child and anxious parent are few examples. This is bound to result in poor compliance.

This study aims to overcome these difficulties by innovating a simple, user friendly home based therapy.

Objectives

General objectives

1. To assess the efficacy of a novel simple method of local heat therapy for single lesion cutaneous leishmaniasis in children.

Specific objectives

1. To assess the efficacy in possible refractory cases
2. To assess adverse outcome in relation to local heat therapy
3. To assess long term outcomes (6 months and one year) of local heat therapy (occurrence of leishmaniasis residivance or progression to mucocutaneous disease)
4. Compare our study with standard therapy.

Method and materials

This interventional study was carried out at the Dermatology Unit, Lady Ridgeway Hospital for Children as an outpatient procedure. Children with

[1,2]*Senior Registrar in Dermatology,* [3]*Consultant Dermatologist, Children's Hospital, Colombo, Sri Lanka.*

smear positive single lesion cutaneous leishmaniasis were included. Children with unrelated severe neurological disease were excluded. All demographic and relevant clinical data were recorded using comprehensive data sheet at initial presentation and during subsequent clinic visits. Pre-treatment and post-treatment photographs were taken using the same digital camera at each visit and compared. Observations of parents were recorded in the parent assessment sheets in each visit and evaluated using simple scoring system.

Delivery of local heat therapy was done by using metal tea spoon following hot water immersion to gain effective but bearable temperature. We wished to achieve target temperature of 45-50 °C at the time of each treatment session which is little above the needed temperature for stopping parasitic multiplication (37-39°). By achieving slight higher temperature we expect to delay rapid cooling of the lesion. Total duration of the treatment was 30 seconds per treatment.

This was repeated to cover whole surface area of the lesion and applied three times a day. Temperature of the water (in a glass) was checked using a thermometer supplied by us throughout the treatment session. To avoid unnecessary damage mother was educated to check bearable temperature, testing it on her identical area of skin immediately before using on the child. Any related adverse effects were recorded in the data sheet.

Assessment of efficacy of intervention

Clinical improvement was assessed twice a week for first month and then monthly using five para-meters which were documented in each clinic visit until complete healing is noted. Erythema, induration, reduction of the size of the lesion, healing of ulcer (if any) and overall improvement were used to evaluate the therapy. Each positive answer carried a plus mark total being 4/5 for each visit. This assessment was done by a responsible medical officer and the parent. Assessment by medical officer was depending on comparison with previous photographs. Following scoring system was used to assess the degree of improvement at the end of 1st, 2nd and 3rd months of follow up. Total period of follow up is one year.

Total score per assessment	*Stage of healing*	*Interpretation*
<25% of total	1	Minimal or no improvement
25-50% of total	2	Satisfactory
50-75% of total	3	Good
75%-100% of total	4	Excellent
100%	5	Clinical cure

Clinical evolution was assessed using the given staging as follows.

Improvement: Stages 1-4 before 3 months follow-up.

Clinical Cure: Stage 5 at any time before 3 months.

Failure: Stage 1-3 at 3 months of follow-up.

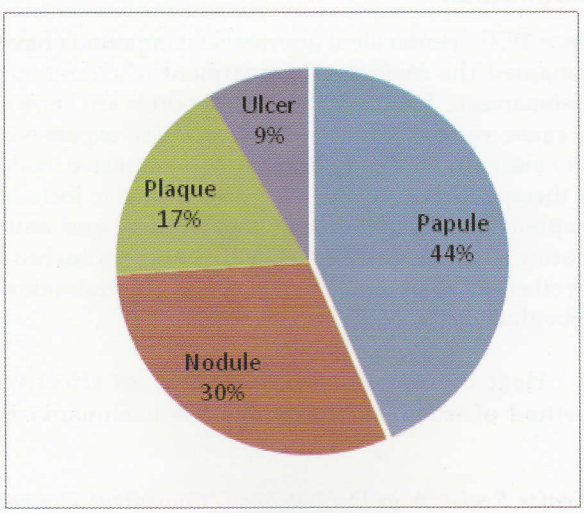
Assessment by parent

Assessment by parent was done in each clinic visit inquiring about satisfaction.

Results

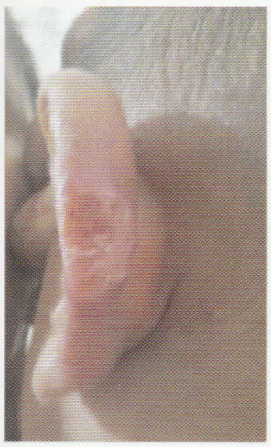
Response	*Score*	*Total score at the time of assessment*	*Stage of healing*
Unhappy	1	<25%	1
Not decided	2	25-50%	2
Satisfactory	3	50-75% 1	3
Happy	4	>75%	4
Very happy	5	100%	5

A total of 19 were registered for the study, however 4 patients were lost to follow up and hence only 15 were enrolled. There were 5 boys and 10 girls, their ages ranging from 11 months to 15 years. Majority had single lesion cutaneous disease (73.33%), localized to the face (66.6%). The commonest clinical presentation was a papule (43.47%). The respective values for the nodular and plaque type lesions were 13.3% and 40%. Among the lesions 33.3% were ulcerated. Four out of 15 had been treated with other multiple modalities of treatment, however failed to achieve a good clinical response. Although 3 out of 15 were failures at 3 months follow up, two of them achieved a complete clinical cure with 6 months of therapy. None of them experienced recurrence in 6 months review.



Case 1

One year and seven months old child presented with a Chiclero ulcer on left ear for 9 months duration. He had been treated with several sessions of cryotherapy and oral fluconazole at a peripheral unit with no clinical improvement over 4 months. Local heat therapy was given for 10 weeks.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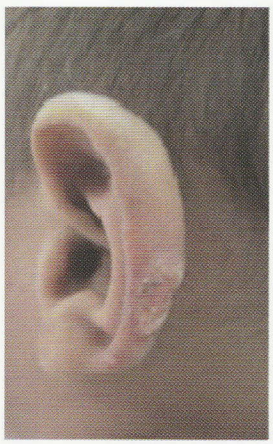
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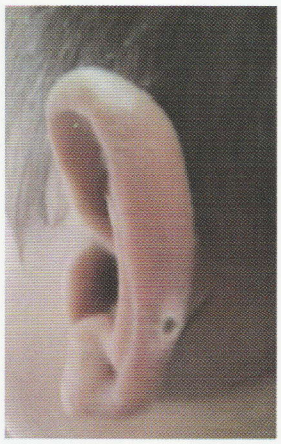
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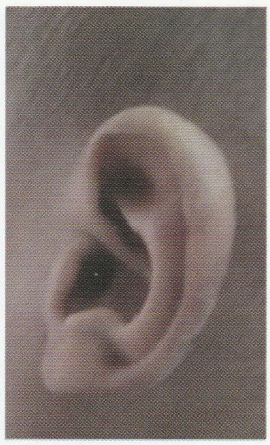
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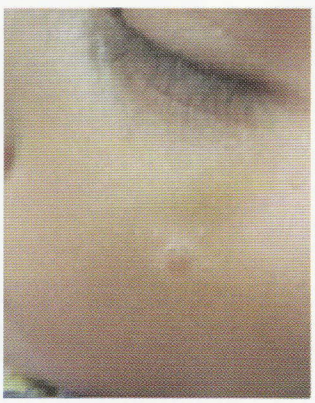
Case 2

One and half year old child presented with a small nodule on left side of the face for 2 months duration. Local heat therapy was given for 8 weeks.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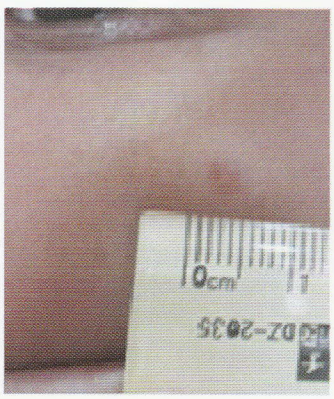

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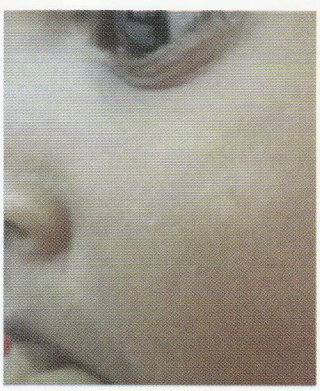
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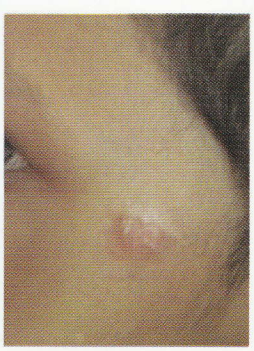
Case 3

A 4 year old child presented with a thin plaque on right cheek for 12 months duration. She has been diagnosed clinically as cutaneous leishmaniasis at a peripheral unit and treated with cryotherapy weekly for 26 sessions with no clinical improvement. Local heat therapy was given for 8 weeks.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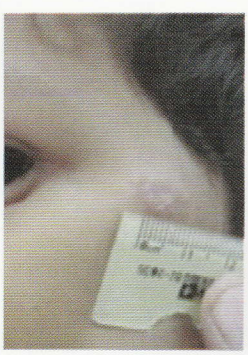
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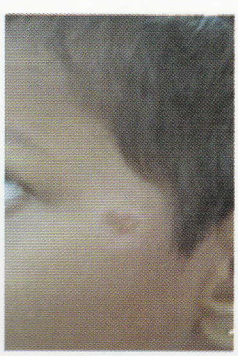
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Case 4

6 year old girl presented with an asymptomatic nodule on forehead for 8 months duration. Local heat therapy was given for 6 weeks duration.


Day 1


4/52


8/52

Case 5

A 7 year old girl presented with asymptomatic lesions for one year duration. Local heat therapy was given for 12 weeks duration.


Day 1


2/52

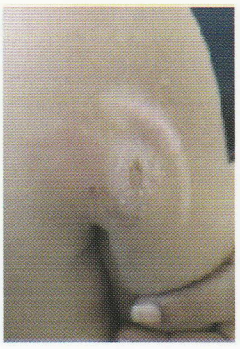

8/52


10/52

Case 6

3 ½ year old boy presented with two asymptomatic nodules on the trunk and R/upper arm for one month duration. He has been treated with 20 sessions of cryotherapy and oral fluconazole 50 mg daily at a peripheral unit with no clinical improvement. Local heat therapy given for longer duration.


Day 1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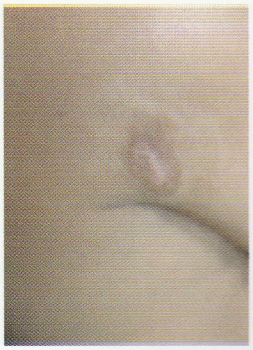
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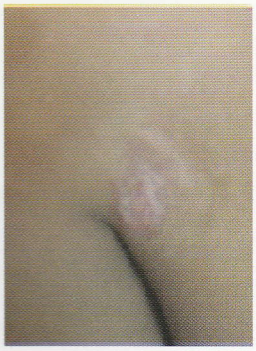
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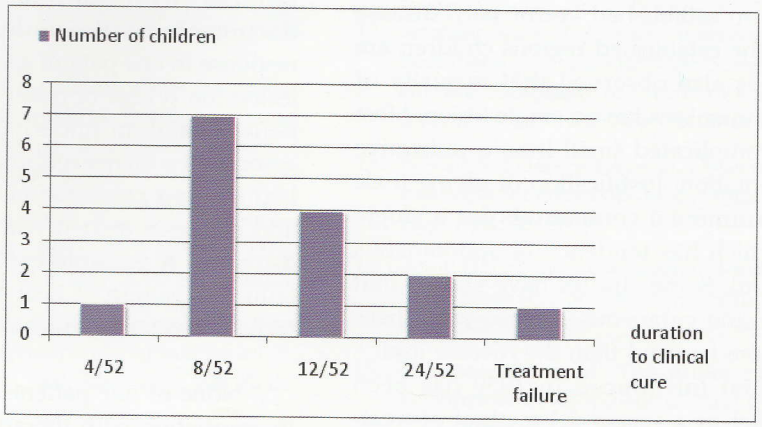
Therapeutic response rate



Parent assessment score

Case No	*Score / month*			*% total score & healing stage*		*Clinical correlation*		
	4/52	*8/52*	*12/52*	*%*	*Stage*	*4/52*	*8/52*	*12/52*
1	4	4		100	5	Improvement	Clinical cure	
2	4	4		100	5	Improvement	Clinical cure	
3	3	4		>75	5	Improvement	Clinical cure	
4	3	1	1	35	2	Improvement	Improvement	Failure
5	4	4	3	>75	4	Improvement	Improvement	Clinical cure
6	4	4	4	100	5	Improvement	Clinical cure	
7	4	4	4	100	5	Improvement	Clinical cure	
8	4			100	5	Clinical cure		
9	3	3	3	>75	4	Improvement	Improvement	Failure
10	4	4	4	100	5	Improvement	Improvement	Clinical cure
11	4	4	4	100	5	Improvement	Clinical cure	
12	3	4	4	>75	5	Improvement	improvement	Clinical cure
13	3	1	1	35	2	Improvement	No imrpovemnt	Failure
14	4	4	-	100	5	Improvement	Clinical cure	
15	3	4	4	>75	5	Improvement	Improvement	Clinical cure

Assessment by principle investigator

Case No	*Score/month*			*Percentage*			*Healing stage*		
Months	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*
1	5/5	5/5		100	100		4	5	
2	3/4	4/4		75	100		3	5	
3	3/4	4/4		75	100		3	5	
4	2/4	1/4	**1/4**	50	25	**25**	3	2	**2**
5	4/4	4/4	**4/4**	100	100	**100**	4	4	**5**
6	4/4	4/4		100	100		4	5	
7	4/4	4/4		100	100		4	5	
8	4/4			100			5		
9	3/4	3/4	**3/4**	75	75	**75**	3	3	**3**
10	5/5	5/5	**5/5**	100	100	**100**	4	4	**5**
11	3/4	4/4	**4/4**	75	100	**100**	4	4	**5**
12	3/4	4/4	**4/4**	75	100	**100**	4	4	**5**
13	2/4	2/4	**2/4**	50	50	**50**	2	2	**2**
14	4/4	4/4		100	100		4	5	
15	2/4	3/4	**4/4**	50	75	**100**	2	4	**5**

Discussion

Lieshmaniasis is an established vector born disease in Sri Lanka. In the established regions children are also affected. It is also observed that majority of children with leishmaniasis have a single lesion. Most of them had uncomplicated small lesions indicative of an early presentation. Justification of giving toxic drugs such as antimonial compounds for a single lesion disease which has tendency of spontaneous healing is doubtful. Some studies have shown that treating single lesion cutaneous disease with these compounds is more harmful than the disease itself [3]. Heat therapy, first introduced in 1950 has been practiced thereafter as a successful method of treatment for cutaneous leishmaniasis. Leishmania species are heat labile and possess a different sensitivity pattern[5].

Pathogenesis of cutaneous disease is mediated through Th 1 dominant inflammatory cytokines. Th 1 dominating cytokines such as INF-, TNF-α and IL- 12 combat against the development of the disease by eliminating the organism, while, Th 2 dominating immune response with IL-4. IL- 10 and TGF-β facilitate parasitic multiplication and disease progression. Heat therapy acts by modification of these cytokines[16,17] and by preventing parasitic multiplication. However, pattern of heat sensitivity of organism matters significantly in therapeutic outcome.

At the beginning heat has been delivered locally using hot water[13]. Subsequently, heat therapy has been evaluated using several heat delivering modalities such as ultrasound[14], radio waves[1] and infra red. Delivery of controlled temperature was a practical problem till Thermomade, a device which generates a local temperature of 50°C using radio frequency technology was implemented[2]. Its' use is largely supported by randomized clinical trials and recommended by World Health Organization (WHO) as an alternative therapy for cutaneous leishmaniasis.

Number of studies have proven the effectiveness of local heat therapy[1, 2, 7, 8]. Twelve out of fifteen of our patients responded very well achieving complete clinical cure (stage 4 healing) within 12 weeks of therapy. In fact another two achieved a clinical cure after 6 months of treatment. Unfortunately, one failed to achieve clinical cure at 6 month of treatment and defaulted. Two of our patients had been treated with multiple sessions of cryotherapy without any clinical improvement and one has received combined therapy with oral fluconazole.

The success of local heat therapy for the treatment failures with antimonial compound is well documented[13]. Possibilities for poor therapeutic response in one patient are: anatomical location of the lesion (on bridge of nose) leading to inadequate heat delivery and an underlying immunological defects associated with neurofibromatosis (NF1). Second child had delayed presentation to our centre (> 1 ½ years) and has been treated with cryotherapy for one year duration. A possible explanation for the treatment failure is pattern of heat sensitivity of the organism, or heat resistance which needs to be confirmed.

None of our patients developed adverse effects in association with therapy other than mild burning that experience by two out of fifteen. Two patients had multiple lesions and one had large lesion with 5-6 cm in diameter. Both responded well to local heat therapy delivered via novel technique enumerating its validity and efficacy.

The novel technique of local heat delivery avoided practical difficulties such as frequent hospital visits, straining the child, parental disappointment and anxiety and adverse effects related to other therapies (scarring following cryotherapy). It also provides a valuable solution for lacking an expensive sophisticated instrument such as Thermomade. Child will be much comfortable in his home environment and with familiar caregiver.

This study has number of advantages. It is safe and efficacious. As the treatment is home based, travelling and hospital stay is avoided. The technique is painless, user friendly and based on simple technique with minimal cost.

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