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Original Research Article

Efficacy of 1% Gammabenzene Hexachloride Vs 5% Permethrin in Scabies: Single and Twice Application

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Abstract:

Background: Scabies is a common pruritic contagious disease where various drugs have varying levels of safety profiles.

Aims and Objective: To compare the efficacy of a single application of topical 1% gamma benzene hexachloride over topical 5% permethrin in scabies. Also, to compare the single application of the above drugs over the twice application.

Materials and Methods: In this single-blind randomized clinical study, 200 clinically diagnosed cases of scabies were randomly allocated into four groups. Group A patients and their family contacts received a single application of 1% Gammabenzenehexachloride lotion, Group B patients and their family contacts received a single application of 5%permethrin, Group C patients and their family contacts received a double application of topical 1%gammabenzene hexachloride and Group D patients and their family contacts received a double application of 5% permethrin. Patients were followed up at 1st, 2nd and 4th week. The cure was labelled once there was the absence of lesions and pruritus at the end of 4th week. Statistical analysis was done using chi-square and student-t test.

Results: In Group B the reduction in pruritus and number of lesions was 88.1% over 40% in Group A, and the absolute cure was 97.8% in Group D over 77.5% in Group C at the end of the 4th week. No serious adverse events were observed.

Conclusion: Double application of 5% permethrin was found to be superior to double application of 1% lindane and single application of 5% permethrin is better than single application of 1% lindane.

Keywords: scabies, 1% lindane, 5% permethrin.

Introduction

Scabies is an infestation of the skin, caused by Sarcoptesscabiei var. hominis (itch mite). It is a contagious pruriginousparasitosis that affects millions of people and is the most common parasitic infestation of humans in the tropics. [1] The prevalence of scabies was 24.2% in the population in Dhauratanda region of Uttar Pradesh. [2] It has an initial incubation period of 6 to 8 weeks but the mite can live off the human skin for up to 3 days, therefore, some infections can occur from exposure to fomites. [3] Overcrowding and poor personal hygiene play an important role in the transmission.

Scabies clinically present as burrows, papules, vesicles, and nodules in a circle of Hebra pattern. There are plenty of antiscabeitic drugs available in the market but an ideal drug should be safe effective and low cost. Children and pregnant women are not advised to use lindane because of several reports of potential neurotoxicity and convulsions.[4] There have also been reports of rising resistance to the gamma benzene hexachloride. [5] Topical 5% permethrin cream is currently the drug of choice in the treatment of scabies. [6] As there is always a need for safe, effective, and cheaper medicine, this study was done to compare the efficacy of lindane 1% with 5%permethrin.

Methods

A randomized single-blind comparative study was done in patients who were clinically diagnosed with scabies, and attending the outpatient department of Dermatology, in F. H. Medical College over one year (1st October 2022 to 30th September 2023).

Case selection: Patients presenting with burrows, papules, and/or vesicles at interdigital web spaces, medial aspect of upper limb, axilla, periumbilical, groin, genitalia, and medial aspect of lower limbs associated with nocturnal pruritus and or family history of scabies in the age group of 1-60 years were included in the study.

Exclusion Criteria

- Norwegian scabies
- Pregnant and lactating women
- History of taking any antiscabietic, antihistaminic, antidepressant, or steroid treatment within four weeks
- Known cases of HIV/AIDS
- Any localized or generalized secondary infection
- History of any systemic diseases

Methodology

The intensity of pruritus was assessed by visual analog scale graded as follows: Grade 0-no itching, Grade 1- mild, Grade 2- moderate, Grade 3 – intense, Grade 4- very intense. The severity of lesions was graded by counting the number of lesions. It was divided into 4 groups: Grade 0- no lesions, Grade 1- ≤ 10 lesions, Grade 2- 11-49 lesions, and Grade 3- >50 lesions. A detailed systemic examination was done and also recorded.

Block Randomization: A total of 200 patients were randomly allocated into four groups with each group having 50 patients. Using a sequentially numbered list with treatment groups written in a sealed envelope, the particular group was allotted to the patient.

Group A patients and their family contacts received a single application of 1% gammabenzenehexachloride lotion (LS1). Group B patients and their family contacts received a single application of 5% permethrin cream (PS1), Group C patients and their family contacts received a double application of topical 1% gamma benzene hexachloride (LS2) and Group D patients received a double application of 5% permethrin cream (PS2).

Procedure: Patients were advised to apply 5% permethrin cream 30gm or a thin layer of lotion 1% lindane from below the neck up to toe on the dry skin especially between web spaces and subungualareas and avoiding the application over bruises or mucosal parts of genitalia, oral cavity and eyes at night and to bathe the next morning i.e after 8 hours. If the topical drug is washed off during perineal care or hand washing, the drug was reapplied. The quantity of lotion or cream depended upon the age group. For less than 6years 30ml or 30gm, for 6-10 years- 40ml or 30gm and for >10years 60ml or 60gm.

Using a small soft brush of a 2-inch (5-cm) paintbrush scabicide should be applied to every square inch of skin, from the posterior ear folds to the entire body, including the intergluteal cleft, navel, crevices of contracture extremities, and webs between fingers and toes.

If the patient complained of nausea, vomiting, giddiness, tremors, paraesthesia, seizures, erythema, and rash after one application then the second application was withheld and they were treated symptomatically. To ensure that the patient had applied the drug, they were asked to get the empty tube or bottle of lotion.

Evaluation: The outcome of treatment was clinically assessed by an independent observer at 1st week, 2nd week, and 4th week for the intensity of pruritus and number of lesions. Treatment efficacy was measured by recording the severity of pruritus and the number of lesions. Patients were labelled as an absolute cure if no new lesions appeared and the itching resolved completely and labelled as treatment failure if they continued to have itching and/or new lesions at the end of the 4th week.

Analysis: The results of the study were statistically analyzed using SPSS version 22 using chi-square and student t-test. A p-value of <0.05 was considered statistically significant.

Results

A total of 200 patients were eligible for randomization, 50 patients were allotted to each of the four groups. Only 172 patients were included in the study and 28 were lost to follow-up. Of the 172 patients, 45(26%) patients were in LS1, 42(23%) were in LS2, 40(25%) were in PS1 and 45(26%) were in PS2. The maximum number of patients (38%) were in the age group of 1-10 years. It was more commonly seen in teenagers, with a median of 17 years with male predominance. The demographic characteristics are shown in (**Table:1**).

Table 1: Demographic characteristics

Characteristics		LS1	PS1	LS2	PS2	P value
Age (years)	**Mean± SD**	19.20 ±13.34	17.31 ±13.45	17.31 ±13.45	16.79 ±14.47	0.426
	Median	20.00	17.00	17.00	14.50	
Sex	**Males**	58%	60%	56%	58%	0.983
	Females	42%	40%	44%	42%	

Duration (days)	**Mean**	14.66 ±16.79	18.76 ±24.61	18.76 ±24.61	19.58 ±27.44	0.576
	Median	7	7	7	7.50	
Nocturnal pruritus	**Present**	88%	82%	86%	88%	0.802
Overcrowding	**Present**	46%	52%	36%	46%	0.446
Family/Contact History	**Present**	88%	88%	84%	88%	0.912

Comparing the four allocation groups with pruritus, in LS1 the pruritus median at baseline and 4th week were 3.00 and 1.00, in PS1 2.5 and 0, in LS2 3.0 and 0, and PS2 3.0 and 0. This shows that the reduction in pruritus in PS2 was maximum followed by PS1, LS2, and LS1.

The reduction in pruritus within the group and in between the four groups at 1st, 2nd, and 3rd visits was done using F-test as shown in (**Table:2**).

Table 2: Assessment of Pruritus within and in between the four groups

	F- test	**p-value**
Pruritus at baseline within and between four groups	0.479	0.697
Pruritus at 1_wk within and between four groups	5.634	0.001
Pruritus at 2_wk within and between four groups	23.34	0.000
Pruritus at 4_wk within and between four groups	17.250	0.000
F-test - Fischer's test		

The reduction in pruritus in four groups was assessed at every follow-up using a Chi-square test as shown in (**Table: 3**) which showed a significant reduction in pruritus (p=0.0).

Table 3: Assessment of pruritis of four groups at each follow up

Characteristics	**Chi square**	**p-value**
P_baseline	1.329	0.722
P_1 wk	15.815	0.001
P_2wk	50.679	0.00
P_4wk	40.269	0.00

At the baseline, among the assessment of lesions, Grade 3 lesions were present in 23(29.5%) patients, in LS1, 19(24.4%) patients in LS2, 19(24.4%) in PS1, and 17(21.8%) patients in LS2. At the first visit, Grade 2 lesions were present in 27(23.3%) patients in LS1, 31(25.6%) patients in LS2, 30 (24.8%) patients in PS1 and 33 (27.3%) patients in PS2. None of the patients had grade 1 or grade 0 lesions.

The median reduction in the number of lesions in the subsequent follow-up was maximum in the PS2 (45.00 at baseline to 0.00 at fourth week), PS1 (43.50 at baseline to 0.00 at fourth week, LS2 (46.00 at baseline to 0.00 at fourth week) and then LS1 (47.00 at baseline to 0.00 in the fourth week).

Comparing lesions within and in between four groups the reduction in the number of lesions within a group and between the four groups at 1st, the 2nd,3rd visit was done using the F-test, showed that the reduction in the number of lesions from baseline (p=0.729) and at fourth week (p=0.0) was statistically significant, shown in (**Table 4**)

Table 4: Assessment of Number of Lesions Within and Between the Four Groups

Lesions	**F-test**	**p-value**
Lesions at baseline within and between four groups	0.434	0.729
Lesions at 1_wk within and between four groups	3.681	0.13
Lesions at 2_wk within and between four groups	8.415	0.000
Lesions at 4_wk within and between four groups	6.595	0.000

Comparing the reduction in the number of lesions of four groups at each follow-up showed that at baseline (p=0.799) and at fourth week (p=0.0).

The assessment of the number of lesions at the end of the 4th week using Chi-square test showed that in LS1, 36 (80%) patients had absence of lesions, in PS1 41 (97.6%), in LS2 39 (97.5%) and PS2 45 (100%) patients respectively (P=0.0).

The assessment of the absolute cure in the 4th week was defined as the absence of pruritus and absence of lesions in all four groups is shown in (**Figure: 1)**

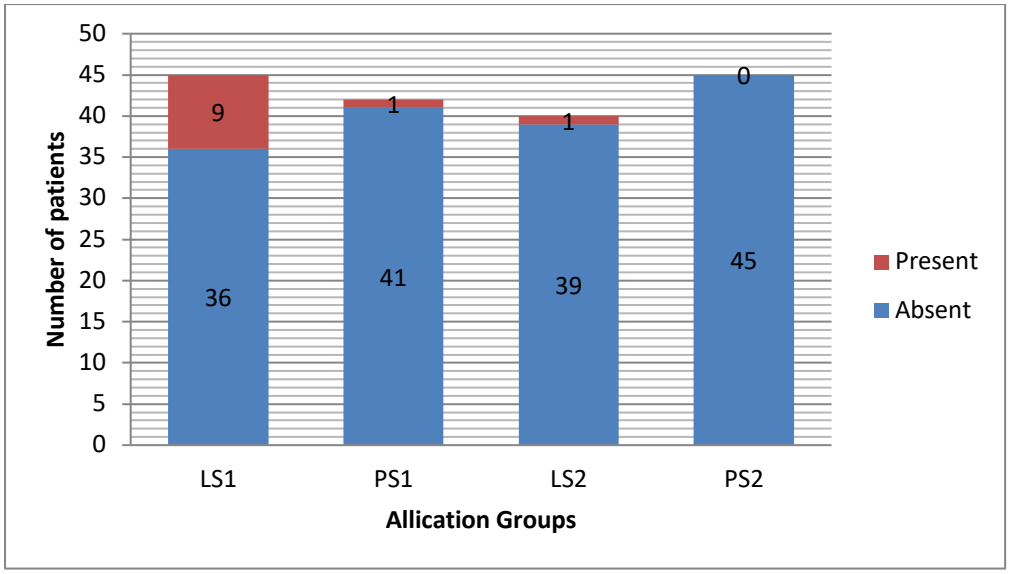

Figure 1: Assessment of Lesions at 4th week

Appendix	
L baseline	Total number of lesions at baseline
L1 wk	Total number of lesions at first week
L 2wk	Total number of lesions at second week
L 4wk	Total number of lesions at fourth week

No cutaneous or systemic drug-related adverse effects were seen in this study.

Discussion

This study is randomized controlled trial, done to evaluate the best mode of application of the two drugs and the cure of scabies concerning the reduction of pruritus and number of lesions without antihistamines.

1%Lindane is a potent insecticide that exerts its parasiticidal action by being absorbed in the parasite's exoskeleton, blocks the gamma-aminobutyric acid (GABA) gated chloride channel leading to hyperexcitation of the central nervous system resulting in paralysis and death of parasite or ova. FDA cautions that lindane products should only be used in cases where individuals are resistant to or cannot tolerate other treatments. [7,8]

Permethrin acts on the nerve cell membrane, disrupts the sodium channel current, and causes polarization. Delayed repolarization leads to death of the parasites at all stages of the life cycle of the mite including ova [9,10]Permethrin is approximately 20 times less permeable through human skin than lindane and the risk for toxic effect is projected to be 40–400 times lower for 5% permethrin cream. [11,12]

In this study, the median age of the patients was 17 years and predominantly males 58% were involved. The mean duration of the disease was 18 days. The classical triad for the diagnosis of scabies are nocturnal pruritus and family history [13] which were present in 88%, and the morphology of the lesions was predominantly papular lesions.

Gamma benzene hexachloride is widely available in resource-poor areas, cost-effective especially when all the family members have to be treated. It is known neurotoxic drug for the treatment of scabies and contraindicated in infants and pregnant women. But the persistence of lesions and recurrence of pruritis after 28 days of treatment indicates resistance. [14]Permethrin on the contrary is safe in all the age groups and effective. In addition, a recent study revealed that permethrin in a new thermolabile foam formulation may induce a more rapid and complete resolution of itching in scabies. [15]

In our study, the efficacy of a single application of 1%lindane (LS1) with that of 5% permethrin (PS1) showed a significant reduction in pruritus and number of lesions in 88.1% in the PS1 group and 40% of LS1 from baseline 42% and 45% of patients respectively at the end of 4th week(p=0.00). Similarly, comparing the efficacy of double application of 1% lindane (LS2) with that of 5% permethrin (PS1) showed a significant reduction in pruritus and several lesions in 97.80% in the PS2 group and 77.50% in the LS2 group from the baseline 44% and 40% of the patients respectively, at the end of the fourth week (p=0.004).

Zargari O, Golchai J, Sobhani A, et al [16] conducted a similar study in 2006 and observed an improvement of 84.6% after one month with

double application of permethrin and 48.9% with double application of lindane. Similar were the results by Schultz MW, Gomez M, Hansen RC, et al, [17]in 467 patients, with complete resolution in 91% in 5% permethrin treated and 86% in 1%lindane treated patients respectively.

Taplin D et. Al [18,19]conducted an investigator-blinded randomized study, where at the end of 1 month, 91% ($p \leq 0.025$) were cured with single application of 5% permethrin group and 65% in the single application lindane group.

However, a single application of permethrin is still better than the double application of 1%lindane. Considering the cost to the patient, the single application of 5% permethrin is more cost-effective than the single and double application of 1% lindane. In all four groups, none of the side effects were observed like irritation, mild burning, or irritant dermatitis.

Limitation: This is a small study with patients visiting the department of dermatology, however, a large study can be conducted at the regional level to further confirm the validation of this study.

Conclusion: Double application of 5% permethrin is better than its single application and also over single and double application of 1% lindane. A single application of 5% permethrin is better than a single and double application of 1% lindane in scabies. The most cost-effective treatment is a single application of permethrin but a double application of 5% permethrin is the preferred drug in all age groups.

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