British Journal of Medicine & Medical Research
3(4): 2317-2324, 2013

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Treatment of Pityriasis Versicolor. A Comparative Study of Topical 4% Potassium Hydroxide Solution Versus 1% Clotrimazole Solution

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Authors' contributions

This work was carried out in collaboration among all authors. Author HRAH designed the study, reviewed the protocol, and wrote the manuscript for publication. Authors HAS and EJA collected and analyze the data. All authors read and approved the final manuscript.

Research Article

Received 28th June 2013
Accepted 13th August 2013
Published 12th September 2013

ABSTRACT

Aims: To evaluate the effectiveness of topical 4% potassium hydroxide (KOH) solution in the treatment of pityriasis versicolor in comparison with topical 1% clotrimazole solution.
Study Design: Single-blinded, comparative therapeutic study.
Place of the Study: Department of Dermatology and Venereology – Baghdad Teaching Hospital-Baghdad, between June 2008 and August 2009.
Methodology: We included 90 patients divided into 2 groups: group A (4% KOH), Includes 46 patients and group B (1% clotrimazole), and includes forty four patients.
Skin scraping test was done for all patients. KOH was applied once daily, while clotrimazole solution twice daily for 2 or 4 weeks according to the response.
Results: Eighty patients completed the study; forty in each group. In group A, 31 (77.5%), 8(20%) and 1 (2.5%) patients showed complete, partial and no response respectively after 2 weeks. After 4 weeks, 39 (97.5%) patients showed complete response and 1 (2.5%) patients showed partial response. In group B, 20 (50%), 18 (45%) and 2 (5%) patients showed complete, partial response and no response

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respectively after 2 weeks. After 4 weeks, 38 (95%) patients showed complete response and 2 (5%) patients showed partial response. There was a significant difference at 2 weeks of treatment. Group A showing a better response than group B (p=0.02). Itching, burning sensation, and erythema were detected in few patients of both groups.
Conclusion: Topical 4% potassium hydroxide solution seems to act more rapidly than 1% clotrimazole solution for pityriasis versicolor.

Keywords: Potassium hydroxide; clotrimazole; pityriasis versicolor.

1. INTRODUCTION

Pityriasis versicolor (PV) is a mild chronic infection of the skin caused by Malassezia yeast, and characterized by scaly, discoloured or depigmented areas mainly on the upper trunk [1].

Several modalities have been used in the treatment of pityriasis versicolor for example, imidazoles, selenium sulphide shampoos and lotions, ciclopirox olamine, zinc pyrithione shampoos, salicylic acid preparations and tretinoin cream [2, 3].

Potassium hydroxide (KOH) solution is a strong alkali known to digest keratin [4]. For this reason we decided to use KOH as a therapeutic agent for PV. In Dermatology KOH has been used successfully in the treatment of genital warts and molluscum contagiosum [5,6].

The aim of the present work is to evaluate effectiveness of KOH in treatment of pityriasis versicolor in comparison with clotrimazole solution.

2. MATERIALS AND METHODS

This was a single-blinded, randomized, comparative therapeutic study of topical 4% potassium hydroxide solution in comparison with topical 1% clotrimazole solution in the treatment of pityriasis versicolor.

We thought that 4% KOH is appropriate concentration, because in a pilot study using 10% KOH conducted on 3 patients; irritation was the result. Other 4 patients were treated by 2.5% KOH and the results were weak.

Ninety patients with pityriasis versicolor were included in this study. They had all attended the Department of Dermatology and Venereology – Baghdad Teaching Hospital during the period from June 2008 to August 2009.

Patients with diabetes mellitus, renal failure, immunosuppressive diseases, those on immunosuppressive therapy, pregnant and breast feeding women and patients with more than10% involvement were excluded. Only patients with positive skin scraping test who were without topical and / or systemic antifungal preparation for at least 2 months were included. Patients were randomized using computer based system.

From each patient, a written consent was granted. The study was approved by the ethical committee.

A full history was taken from each patient reporting the name, age, sex, marital status, residence, job, drug history, seasonal variation, family history, disease duration, and complaint of the patient.

A clinical examination of the lesions was performed, reporting the site, colour, presence of scales and erythema. For each patient, it was carried out by all authors.

Skin scraping test was done by dissolving the scales in 10% KOH solution, when this revealed short stubby hyphae and yeast forms, the test was considered positive. It was done by Dr. Atiya and Salman for each patient and at each visit.

Wood's light examination also performed to determine the site, extent of the lesions, and as a confirmatory test.

2.1 Treatment

Patients were divided into 2 groups:

2.1.1 Group A

Topical 4% potassium hydroxide.

2.1.1 Group B

Topical 1% clotrimazole.

Potassium hydroxide 4% solution was applied once daily at night using cotton swab and it was left till morning and can be washed off without soap. Clotrimazole solution 1% was applied twice daily as a thin coating to the entire lesions. The drugs were used for 2 or 4 weeks. Treatment was stopped after 2 weeks if the response was complete and continued for 4 weeks if the response was incomplete at 2 weeks.

2.2 Preparation

Potassium hydroxide was obtained from BDH chemicals Ltd. company Poole, England. The desired concentration was prepared by dissolving 4 grams of potassium hydroxide in 100 ml distilled water, pH=12.5.

Clotrimazole 1% solution was obtained from the Arab Drug Company Egypt, 1% solution bottle of 20 ml; 1 ml contains 10 mg clotrimazole.

2.3 Evaluation

Each patient was evaluated (clinically, skin scraping test and wood's light) and asked about any possible side effects, every 2 weeks for the treatment period and every 2 weeks for 1 month follow up period. All patients were photographed by a digital camera as a baseline and then every 2 weeks, in the same place with fixed illumination and distance by using a digital camera (Lumix Panasonic DMC-TZ3 with optical zoom 10X). The photography was performed in day light. Photographs were carried out by Dr. Atiya. They were seen by 2 independent dermatologists to observe the pre and post treatment results.

2.4 Clinical Response Score

2.4.1 No response

If there is no change in size and scaling of lesion on clinical examination and the skin scraping test examination remains positive.

2.4.2 Partial response

If there is a clinical improvement with a positive scraping test.

2.4.3 Complete response

If there is a clinical improvement with a negative scraping test.

Resolution of pigmentary changes was not a criterion for response to treatment. This is because return of normal pigmentation may take several weeks after the clearance of pityriasis versicolor organism.

2.5 Statistical Analysis

Statistical analysis was done using Chi-square. P-value of less than 0.05 was considered to be significant.

3. RESULTS

A total of 90 patients were enrolled in this study, 10 of them defaulted (7 in group A and 3 in group B) during the first 2 weeks of treatment for unknown reasons; the remainder 80 patients completed the study.

Of those patients, 52 (65%) were males and 28 (35%) were females, with a male to female ratio 1.8:1, the ages of patients ranged from 10-56 (mean ± SD=25.16±11.67) years. The duration of the disease ranged from 1-24 months, the median was 3 months.

History of itching was recorded in 25 (31.25%) patients. Seasonal variation has been found in 27 (33.75%) patients. All noticed exacerbation in the summer. Family history of pityriasis versicolor was positive in 22 (27.5%) patients. Previous history of pityriasis versicolor has been found in 18 (22.5%) patients.

The main sites affected were the chest in 54 (67.5%) patients, neck in 40 (50%), arm in 38 (47.5%), back in 36 (45%), abdomen in 28 (35%), axilla in 18 (22.5%), forearm in 8 (10%) and face in 3 (3.75%) patients.

3.1 Treatment Groups

3.1.1 Group A

Forty patients with pityriasis versicolor completed the study in this group, 27 (67.5%) patients were males and 13 (32.5%) patients were females.

The ages of patients ranged from 10-53 (mean ±SD = 25.07+11.0) years. The duration of the disease ranged from 1-24 months, the median was 3 months.

After 2 weeks of treatment; 31 (77.5%) patients had complete improvement, 8 (20%) patients had partial improvement and 1 (2.5%) patient showed no response (Table 1).

After 4 weeks of treatment, 39 (97.5%) patients showed complete response and 1 (2.5%) patient had partial response (Table 2).

Regarding skin scraping test, 5 (12.5%) patients were positive at 2 weeks and 1 (2.5%) patient at four weeks.

Table 1. Response among pityriasis versicolor patients at the end of 2nd week of treatment

Response	Group A		Group B		P value
	No.	%	No.	%	
No response	1	2.5	2	5	= 0.5562
Partial response	8	20	18	45	= 0.0317
Complete response	31	77.5	20	50	= 0.02

Table 2. Response among pityriasis versicolor patients at the end of 4th week of treatment

Response	Group A		Group B		P value
	No.	%	No.	%	
No response	0	0	0	0	= 0
Partial response	1	2.5	2	5	= 0.5562
Complete response	39	97.5	38	95	=0.5562

3.1.2 Group B

Forty patients with pityriasis versicolor completed the study in this group, 25 (62.5%) patients were males and 15 (37.5%) patients were females.

The ages of patients ranged from 10-56 (mean ±SD = 25.25+12.45) years. The duration of the disease ranged from 1-24 months, the median were 3 months.

After 2 weeks of treatment, 20 (50%) patients had complete response, 18 (45%) patients showed partial improvement and 2 (5%) patients showed no response (Table 1).

After 4 weeks of treatment, 38 (95%) patients showed complete improvement and 2 (5%) patients with partial response (Table 2).

Regarding skin scraping test, 11 (27.5%) patients were positive at 2 weeks and 1 (2.5%) patients at 4 weeks of treatment.

After 2 weeks of treatment, there was a statistically significant difference regarding the response between the 2 groups; Chi-square (with Yates correction) = 5.40, *P*=0.02 (Table 1). Group A had better response.

After 4 weeks of treatment, there was no statistically significant difference between the 2 groups. Chi-square (with Yates correction) = 0.3463, *P*= 0.5562 (Table 2).

Regarding skin scraping test, there was no statistically significant difference between the 2 groups.

After 4 weeks of follow up period, no patients in group A and group B showed recurrence of lesions of pityriasis versicolor.

Side effects of both drugs were mild and included: itching and burning sensation in 2 (5%) patients in group B and burning, itching and erythema in 8 (20%) patients in group A. These side effects did not require discontinuation of the treatment.

4. DISCUSSION

Pityriasis versicolor is a prominent cosmetic dermatological problem all over the world. The adverse cosmetic effects of the lesion may lead to significant emotional distress, particularly in adolescents [7].

There are many effective agents used for treatment of this disease, some have non-specific antifungal activity and act by physical and/or chemical means removing the infected dead tissue in the stratum corneum and/or affects cell turnover [2, 3].

Other agents have specific antifungal activity like imidazoles and triazoles which inhibit the cytochrome p450 enzyme and interfere with fungal ergosterol synthesis, while allylamine drugs have fungicidal activity. They inhibit squalene epoxidease enzyme [8]. Potassium hydroxide is a strong base and is alkaline in solution; in dermatology it is used for diagnostic purposes for example the diagnosis of superficial fungal and yeast infections [9].

To the best of our knowledge, there is no report of the use of KOH solution in the treatment of pityriasis versicolor.

The present work showed that 4% KOH solution and 1% clotrimazole solution were both effective in clearing the lesion of pityriasis versicolour after 4 weeks of treatment. However, KOH acts more rapidly than clotrimazole because it produced complete response in 77.5% of patients in comparison to 50% for clotrimazole solution at 2 weeks of treatment.

The mechanism of action of KOH is not clear. However, because the usual location of the malassezia spp. within the superficial layers of the skin that is within the stratum corneum, and because KOH is a caustic peeling agent and dissolves keratin, it may solubilize and dissolve the infected stratum corneum [7]. Also it is reported that KOH act as fungicide in agriculture [10].

We did not do safety study after exposure to sunlight because in our study KOH applied at night. KOH is odourless and does not stain clothes and in the present study did not resulted in irritation of the axilla and face.

We did not read any report that KOH is not safe in children. In our study the youngest age was 10 years old, safety on younger children <10 years was not evaluated in the present study.

We used 4% KOH for <10% surface area. It is safe. Safety on larger skin area >10% was not studied.

Multiple relapses occur particularly when larger areas are affected [11]. In the present study larger areas >10% were excluded, so in conclusion a long follow up more than 1 month may be not justifiable.

While clotrimazole, an imidazole antifungal agent exerts its antifungal activity by altering the cell membrane permeability by inhibiting of lanosterol 14 -α-demethylase enzyme which converts lanosterol to ergosterol [8].

The results of the present work were comparable to the results of previous Iraqi studies: sharquie et al showed that tretinoin cream was highly effective in treatment of pityriasis versicolor with cure rate 100% after 2 weeks of therapy but with noticeable side effects like erythema and itching [3].

5. CONCLUSION

Topical 4% KOH solution is effective in the treatment of pityriasis versicolour. It is non costly, single daily application, and cosmetically acceptable with minimal side effects. It seems to act more rapidly than 1% clotrimazole solution.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=205&id=12&aid=1995