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Original Article

Comparison of 5% potassium hydroxide with 10% potassium hydroxide solution in treatment of molluscum contagiosum: A comparative study

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Abstract

Objective To compare the results of 5% KOH versus 10% KOH in treatment of molluscum contagiosum (MC).

Methods 40 children having MC were divided into 2 groups. 5% KOH solution or 10% KOH solution was applied by the patient or a parent on lesions once daily for two weeks or till the appearance of inflammatory signs. Patients were followed up 2, 4, 8 and 12 weeks for efficacy and side effect. Efficacy was categorized as complete remission (≥ 90% clearance of lesions), partial remission (60-90% clearance of lesions) and insignificant improvement (<60% clearance of lesions).

Results By the end of study 16 patients in group A (5% KOH) and 17 patients in group B (10% KOH) were evaluable. Partial remission was seen in 4 (25%) in group A while in group B, 7 (41.2%) patients showed complete remission and 10 (58.8%) partial remission. 100% patients in group B showed local side effect in group A and 52.3% developed local side effect in group B. The side effects were mild and did not require discontinuation of treatment.

Conclusion 10% KOH solution is more effective treatment option for molluscum contagiosum than 5% KOH solution.

Key words
Molluscum contagiosum, potassium hydroxide, efficacy, safety.

Introduction

Molluscum contagiosum (MC) is a cutaneous viral infection most frequently encountered in children. It is caused by *Molluscipox* virus which is the largest human virus.[1] MC usually presents as single or multiple dome-shaped, shiny, pearly white papules that classically have a central dimple. Spontaneous resolution usually occurs by 18 months in immunocompetent individuals; however, lesion may persist even for few years. Lesions are usually asymptomatic. Patients may seek treatment for social and aesthetic reasons because of concerns about spreading disease to others. Currently many modalities like curettage, cryotherapy, pricking with sterile needle, photodynamic therapy, laser, salicylic acid, glycolic acid, tretinoin, podophyllin, cantharidin, trichloroacetic acid, silver nitrate are available.[1]

Potassium hydroxide (KOH) in various concentrations is used by dermatologists routinely for identification of fungal element.[2]

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As it is a strong alkali having keratolytic properties, hence, is used successfully in varying concentrations for the treatment of molluscum contagiosum. As it is cheap and easily available, therefore, it can be potentially a useful treatment modality for MC in resource poor countries.

In an earlier study,[3] we found 10% as effective as cryotherapy in the treatment of MC in children. In the current study, we compared two different concentrations of KOH solution (5% and 10%) in patients having MC to find out the most optimal concentration of KOH for use in MC in children.

Methods

This comparative study was conducted in pediatric dermatology department, in The Children's Hospital, Lahore from January, 2014 to July, 2014. 40 children of age group from 2 to 14 years, diagnosed as MC on clinical grounds, were enrolled in the study. Written consent was taken from the parents of children. Inclusion criteria were patients having <100 lesions and no treatment during previous 1 month. Patients with immunodeficiency and known hypersensitivity were excluded. Information regarding age, sex, site of lesion and previous treatment were recorded. Patients were divided in to 2 groups. Group A treated with 5% KOH solution and group B was treated with 10% KOH solution. Patients were advised to apply KOH preparation with cotton-tipped applicator on every lesion once daily for two weeks or till the signs of inflammation i.e. erythema became evident. The same observer carried out the assessment of therapeutic response at week 2, 4, 8 and 12 by counting MC lesions.

Efficacy was categorized as: complete remission referred to clearing all or 90% of the MC lesions at 12 week and partial remission meant clearing of ≥60% of the MC lesions; patients with <60% clearance were considered as insignificant improvement. Patients were also inquired and examined for any local side effect e.g. erythema, itching, burning, pain, erosion, crusting, pigmentary alterations, scarring etc. The children who achieved complete clinical clearance before the end of the study were re-evaluated 1 month after clearance, and those who developed postinflammatory pigmentary change were followed up for an additional 3 months.

Chi-square test and Fisher's exact test were used for comparison of efficacy and side effects.

Results

Twenty patients were included in both groups i.e. 5% KOH (group A) and 10% KOH (group B). The two groups were well-matched in terms of pre-treatment clinical parameters (**Table 1**). Out of 20 patients in group A (treated with 5% KOH solution), 16 completed the study whereas in group B (treated with 10% KOH), 17 completed the study. The rest were lost to follow-up due to non-treatment reasons. The age of the patients ranged from 1.5 to 14 years; however, the majority was under 12 years. Duration of disease varied from 1 month to 1 year. 94% of patients had MC for less than 6 months. History of MC in the family was noted in 9 (27.3%) cases while personal or familial atopy was present in 13 (39.4%) patients.

The number of lesions varied from 2 to 35. Out of total 33 patients, 25 (75.7%) had lesions on the face, 15 (45.4%) on limbs, 13 (39.4%) on trunk.

Table 1 Baseline clinical data in two treatment groups.

	5% KOH (n=16)	*10% KOH (n=17)*
Sex		
Male: females	8:8	11:6
Age		
Range	1.5-10	1.3-14
Mean	4.5±1.99	5.3±2.05
Duration (months)	1-12	1-24
Mean	4.8±2.68	4.6±2.62
Number of lesions	1-35	1-30
Mean	12.9±8.75	10.9±
Sites of involvement		
Face	9 (56.3%)	16 (94.1%)
Limbs	8 (50%)	7 (41.2%)
Trunk	5 (31.3%)	8 (47.1%)
Genital area	-	1 (5.9%)
Family history of molluscum contagiosum	5 (31.3%)	4 (23.5%)
Personal or familial atopy	6 (37.5%)	7 (41.2%)

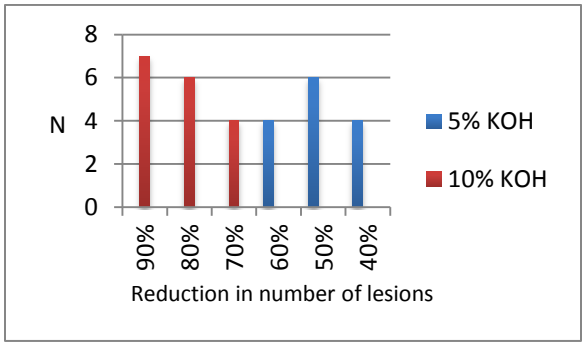

Figure 1 Reduction in the number of lesions (%) at 12 week of treatment.

Table 2 Comparison of efficacy at 12 weeks of treatment.

	5% KOH (n=16)	*10% KOH (n=17)*
Complete remission	0	7 (41.2%)
Partial remission	4 (25%)	10 (58.8%)
Failure	12 (75%)	0

Table 3 Side effects profile in two groups.

	5% KOH (n=16)	*10% KOH (n=17)*
Erythema	9 (56.3%)	17 (100%)
Burning	7 (43.7%)	17 (100%)
Pruritus	0	9 (52.9%)
Crusting	0	7 (41.2%)
Hypopigmentation	0	2 (11.8%)

At final follow-up i.e. 12 week, the reduction in the number of lesions is compared in **Figure 1**. In group A (5% KOH), none of the patients showed complete clearance, however, partial clearance was seen in 4 (25%) patients and the insignificant improvement occurred in the rest (**Table 2**). In contrast, in group B (10% KOH), complete clearance of lesions was noticed in 7 (41.2%) patients whereas 10 (58.8%) partial remission, (p<0.05).

Table 3 compares side effects observed during treatment. In group A (5% KOH), erythema and burning were reported in 9 (56.3%) and 7 (43.7%) patients, respectively. All patients (100%) in group B (10% KOH), complained of burning and developed erythema after application of medicine (p<0.05); however, these side effects gradually reduced after repeated application. 7 (41.2%) also developed crusting. Transient postinflammatory hypopigmentation was seen in 2 (11.8%) patients, which resolved by 2 months after the final follow-up. No significant difference in side effects was seen in individuals with history of personal or familial atopy (p>0.05). No patient discontinued treatment because of side effects.

Discussion

MC is often reported to be a self-limiting dermatosis of children; nonetheless, cosmetic disfigurement, potential threat of autoinoculation and spread to other siblings make parents seek treatment. An ideal treatment besides having high efficacy should also cause minimum pain and scarring in patients. The present study compared the efficacy of 5% and 10% KOH solution in the treatment of MC in children.

Our results showed that 10% KOH solution is significantly more effective than 5% KOH solution in the treatment of MC. By the 12 week

of study, complete or partial remission was seen in all (100%) patients whereas only 4 (25%) patients treated with 5% KOH solution showed partial remission. KOH is a strong alkali, which penetrates the skin because of its keratolytic properties and its effect seems to be concentration dependent. As the concentration of medicine increases, its effect proportionately increases.[2] Many previous studies endorse the results of our study.[3-11]

Romiti *et al*.[4] pioneered the use of KOH in the treatment of MC. They noticed complete clinical cure in 32 of 35 patients after a mean treatment period of 30 days with 10% KOH solution twice daily. Short *et al*.[5] (2006) treated 10 patients each with 10% KOH or placebo and found 70% and 20% clearance, respectively. The average time to clearance was 54 days. Can *et al*.[6] treated 40 children with MC with 10% KOH solution twice daily. They noted complete clearance of lesions in 37 (92.5%) patients after a mean period of four weeks. The 10% KOH solution showed efficacy similar to that of cryotherapy,[3,7] salicylic acid and lactic acid combination,[8] and imiquimod.[9,10] In another study, Köse *et al*.[8] (2013) compared the safety and efficacy of 10% KOH vs. combination of salicylic acid and lactic acid in the treatment of MC in children. They demonstrated complete remission of disease in 83.3% patients with 10% KOH and 100% clearance with salicylic acid and lactic acid combination ($p>0.05$).

However, our results are different from other studies[11-13] which report successful 5% KOH solution in the treatment of MC. Romiti *et al*.[11] compared 5% KOH solution vs. 10% KOH solution twice a day in 20 children and found 5% KOH solution as effective as and less irritating than 10% KOH. They prescribed KOH application twice daily until improvement occurred whereas we used once daily application for two weeks only. We assume that the effect of KOH is concentration dependent and the higher concentration is likely to show he better results. Other studies support this notion. Uçmak *et al*.[13] compared 5% KOH with 2.5% KOH solution in MC. At the end of 60 days, the clearance in two groups was 66.7% and 23.1%, respectively ($p<0.05$).

Regarding the safety of KOH treatment, all of our patients in 10% KOH group and over 56% in 5% KOH group experienced mild side effects. All the aforementioned studies reported a similar profile.[3-13] Erythema and burning are expected to occur with KOH treatment considering its keratolytic effect.

The exact mechanism of action of KOH is not known but the speculated one is as follows. Histopathological features of MC show lobulated, endophytic hyperplasia of keratinocytes, which contain large intracytoplasmic inclusions, and there is usually scanty dermal infiltrate. Poxviruses are supposed to have antagonistic mechanism to innate antiviral immunity, a multi-stage process. The pattern recognition receptors (PRRs) detect viruses at the plasma membrane and trigger signal transduction pathways leading to NFκB activation. NFκB, in turn, induces type I interferon and other pro-inflammatory cytokines from infected cells. Poxviruses inhibit PRRs sensing and NFκB activation.[14] Topical application of KOH, digests keratin and like other physical or chemical therapies, induces inflammation; this in turn stimulates innate and cell-mediated immune response that inhibits MC-induced immunosuppression and eliminates the infection of MC.

Benefits of KOH are it is cheap, easily available and relatively easily tolerated by pediatric age group depending on the concentration of KOH.

10% is the optimum concentration in the majority.

Conclusion

10% KOH solution is more effective than 5% KOH; however, the lower concentration may be used in those intolerant to 10% KOH.

References

1. Chen X, Anstey AV, Bugert JJ. Molluscum contagiosum virus infection. *Lancet Infect Dis*. 2013;**13**:877-88.
2. Potassium hydroxide. Available from: http://en.wikipedia.org/wiki/Potassium_hydroxide. Accessed on July 14, 2014.
3. Muzaffar F. 10% Potassium hydroxide solution vs. cryotherapy in the treatment of molluscum contagiosum: A case-control study. *J Pak Assoc Dermatol.* 2011;**21**:185-9.
4. Romiti R, Ribeiro AP, Grinblat GM *et al*. Treatment of molluscum contagiosum with potassium hydroxide: A clinical approach in 35 children. *Pediatr Dermatol.* 1999; 16:228-31.
5. Short KA, Fuller C, Higgins EM. Double-blind, randomized placebo-controlled trial of the use of topical 10% potassium hydroxide solution in the treatment of molluscum contagiosum. *Pediatr Dermatol.* 2006;**23**:279-81.
6. Can B, Topaloglu F, Kavala M *et al*. Treatment of pediatric molluscum contagiosum with 10% potassium hydroxide solution. *J Dermatolog Treat.* 2014;**25**:246-8.
7. Handjani F, Behazin E, Sadati MS *et al*. Comparison of 10% potassium hydroxide solution versus cryotherapy in the treatment of molluscum contagiosum: an open randomized clinical trial. *J Dermatolog Treat.* 2014;**25**:249-50.
8. Metkar A, Pande S, Khopkar U. An open, nonrandomized, comparative study of imiquimod 5% cream versus 10% potassium hydroxide solution in the treatment of molluscum contagiosum. *Indian J Dermatol Venereol Leprol.* 2008;**74**:614-8.
9. Seo SH, Chin HW, Jeong DW, Sung HW. An open, randomized, comparative clinical and histological study of imiquimod 5% cream versus 10% potassium hydroxide solution in the treatment of molluscum contagiosum. *Ann Dermatol.* 2010;**22**:156-62.
10. Köse O, Özmen I, Arca E. An open, comparative study of 10% potassium hydroxide solution versus salicylic and lactic acid combination in the treatment of molluscum contagiosum in children. *J Dermatolog Treat.* 2013;**24**:300-4.
11. Romiti R, Ribeiro AP, Romiti N. Evaluation of the effectiveness of 5% potassium hydroxide for the treatment of molluscum contagiosum. *Pediatr Dermatol.* 2000;**17**:495.
12. Rajouria EA, Amatya A, Karn D. Comparative study of 5% potassium hydroxide solution versus 0.05% tretinoin cream for molluscum contagiosum in children. *Kathmandu Univ Med J.* 2011;**9**:291-4.
13. Uçmak D, Akkurt MZ, Kacar SD *et al.* Comparative study of 5% and 2.5% potassium hydroxide solution for molluscum contagiosum in children. *Cutan Ocul Toxicol.* 2014;**33**:54-9.
14. Brady G, Bowie AG. Innate immune activation of NFκB and its antagonism by poxviruses. *Cytokine Growth Factor Rev*. 2014;**25**:611-20.