

# Efficacy of topical 10% potassium hydroxide in the treatment of molluscum contagiosum in children

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**Abstract** *Objective* To assess the efficacy of topical 10% Potassium Hydroxide (KOH) in treatment of molluscum contagiosum in children.

*Methods* Interventional study of 90 patients meeting inclusion criteria was done from 6<sup>th</sup> May 2020 to 6<sup>th</sup> Nov 2020. After written informed consent, patients were advised in detail to start topical 10% potassium hydroxide application till appearance of signs of inflammation i.e., redness and followed up in outdoor to assess for complete disappearance of lesions at 2 months. Patient's demographic details, duration of disease at presentation and complete disappearance at 2 months were recorded in the proforma.

*Results* Mean age of the patients was 3.92±1.60 years (range 2 to 6 years). 58.9% patients were male and 41.1% were female. Majority (44.4%) of patients presented with in 10-20 days of appearance of disease. Complete disappearance of disease was noted in 92.2% patients at 2 months of treatment.

*Conclusion* Topical 10% potassium hydroxide is an effective treatment of molluscum contagiosum.

**Key words**

Molluscum contagiosum, topical 10% potassium hydroxide, pox virus.

## Introduction

Viral infections of skin are common worldwide and seen in both primary care and dermatology practices. Most frequently these infections are caused by herpes viruses, papilloma viruses and molluscum contagiosum virus. After eradication of smallpox, molluscum contagiosum is the main poxvirus causing human disease.<sup>1</sup>

Molluscum contagiosum (MC) is a common viral infections of skin in pediatric age group.<sup>2,3</sup> This virus is a huge, DNA virus. Numerous

genotypes exist, however MCV genotype 1 is the most common cause of infection. It occurs frequently in rural region and in tropical climates. Overall prevalence is 2 to 8% in children.<sup>3</sup> It is highly contagious and can be transmitted by person-to-person, auto-inoculation and fomites.<sup>3,4</sup>

The virus is adopted to grow in differentiating cells of the human epidermis and is well adjusted to human hosts. As it cannot overpass the basement membrane, the virus dodges immune surveillance, hence, it is not able to elicit systemic immune response.<sup>5</sup>

Molluscum contagiosum typically presents as single or multiple asymptomatic, dome shaped, pearly white papules with a central umbilication. Their size can vary from 1 mm papules to big

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nodules of 1 cm. The lesions can be pruritic.<sup>1</sup> Most frequently involved anatomical site is trunk, followed by extremities and face.<sup>3</sup>

Molluscum contagiosum can also be transferred sexually and arise on perineal, genital, pubic, and adjacent skin. They may also be seen in or around the mouth. Molluscum contagiosum is also seen in people with an impaired immune system.<sup>1,5</sup> Histologically, these lesions are characterized by lobules of hyperplastic, acanthotic squamous epithelium that form a central crater filled with keratin fragments and molluscum bodies, which are intracytoplasmic and eosinophilic.<sup>6</sup>

Although these lesions are asymptomatic, but these are cosmetically unattractive and 10% of the patients may present with pruritus and eczematous change around the lesions.<sup>4,7</sup> The disease can resolve on its own by 6 to 18 months of time.<sup>3,5</sup> However, these lesions spread and can be a source of concern for parents and caretakers.<sup>5</sup> Therefore, a therapeutic approach is often warranted.<sup>4,8</sup>

Therapies for molluscum contagiosum may be destructive, immunologic, antiviral or antimetabolic in nature. It is important to treat molluscum contagiosum to prevent spread to close contacts. As the disease generally heals on its own and is self-limiting, treatment should not be aggressive. Treatment is meant to eliminate the lesions. A wide range of physical therapies such as electrocautery, cryotherapy, curettage, and lasers are used. Various topical therapies like cantharidine, imiquimod, silver nitrate, and salicylic acid have also been used for its treatment. However, there is no “gold standard” and treatment is often associated with side effects.<sup>8</sup> All available treatment options can cause substantial pain, tissue destruction, and recurrence.<sup>8,9</sup> Children cannot tolerate these procedures due to pain and fear. These

procedures need to be repeated are also not feasible for extensive lesions.<sup>9</sup> So, there is a need for an alternative therapeutic modality that is easy to use, effective, and well tolerated in children.<sup>10</sup>

Topical potassium hydroxide is one of such options which is safe, effective and easily applied by parents/ guardians at home.<sup>2</sup> potassium hydroxide can digest keratin due to its strong alkaline effect.<sup>8</sup> It has been used in various concentrations by dermatologists for fungal scrapings.<sup>10</sup> Various studies report that topical 10% potassium hydroxide (KOH) is effective and safe for the treatment of molluscum contagiosum. Short KA *et al.* conducted a study, where 10% potassium hydroxide was applied to lesions. According to this study lesions were completely cleared in 70% of the patients with average time of clearance of 54 days.<sup>8</sup> In another study, Seo SH *et al.* compared 10% potassium hydroxide with 5% Imiquimod. These agents were applied to lesions at bed time and were then washed off in the morning. By the end of 12 weeks, lesion clearance was 77% and 57% in potassium hydroxide and Imiquimod groups, respectively.<sup>9</sup>

In Pakistan no concrete data is available in this regard, this study is planned to find out efficacy of 10% topical potassium hydroxide (KOH) solution for treatment of molluscum contagiosum in children in our population. Its effectiveness will be a useful addition to therapeutic options in the treatment of molluscum contagiosum, in our routine practice.

## **Patients and Methods**

Interventional study of 90 patients was carried out at Department of Dermatology, Lady Reading Hospital Peshawar from 6<sup>th</sup> May 2020 to 6<sup>th</sup> Nov 2020. The study was commenced after obtaining approval from hospital ethical

committee. Patients were selected by non-probability, consecutive sampling who fulfilled the inclusion criteria i.e. who were diagnosed clinically with a molluscum contagiosum infection on trunk, age ranging from two to six years and whose parents had given consent for participation. Patients who did not fulfill the inclusion criteria, were immunocompromised, had received other topical therapies in the last month, had lesions on face or genital area, were excluded.

After taking written informed consent from parents/guardians, the patients fulfilling the inclusion criteria were enrolled from Dermatology Outdoor of Lady Reading Hospital Peshawar. Demographic history i.e. name, age, gender, and address were taken. A total of five follow-up visits were planned, one at baseline and four visits at 15, 30, 45 and 60 days from baseline. During baseline visit, essential information was recorded and detail clinical assessment was done. Parents/ guardian was provided all necessary information regarding application of potassium hydroxide. Each patient was given 10% potassium hydroxide solution. Guidance was given to parents/guardians of the child regarding application of solution to the lesions in written form, as follows: the solution is to be applied once at night with a toothpick that is soaked in the solution each time for every lesion until the lesion shows signs of inflammation (redness) after which the treatment had to be stopped (parents should note down the date to inform the doctor at the next follow-up visit). No other treatment modality was allowed during this time period. If parents/guardian noted a new lesion, they were instructed not to apply solution to them. Each patient was evaluated during follow-up visits and all the information was noted in a specially designed proforma. An image of the lesion was taken. Compliance of each patient was noted in the completion worksheet. At the end of two months

after initiation of therapy, complete clearance of lesions was noted on designed proforma.

**Data Analysis**

All the data collected was analyzed in SPSS version 10. Age has been presented as mean±standard deviation. Efficacy in terms of complete disappearance of lesions and gender have been presented as frequency and percentage. Stratification of data has been done for duration of disease to address effect modifiers.

**Results**

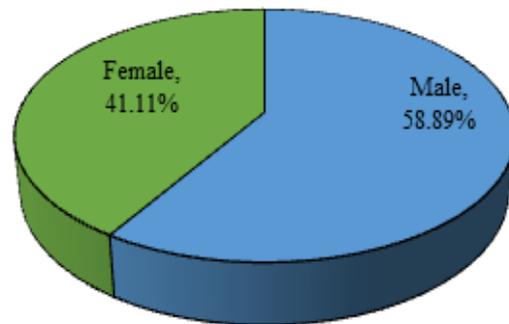
90 patients were included in this interventional study. Mean age of patients was 3.92±1.60 years with age range of 2 to 6 years. It has been shown in **Table 1**. There were 53 (58.9%) males and 37 (41.1%) females as shown in table 2 and further elaborated in pie-chart in **Figure 1**.

**Table 1** Descriptive Statistics for Age

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Std. Deviation</i>
Age of the patient	90	2	6	3.92	1.602

**Table 1** Descriptive statistics for gender

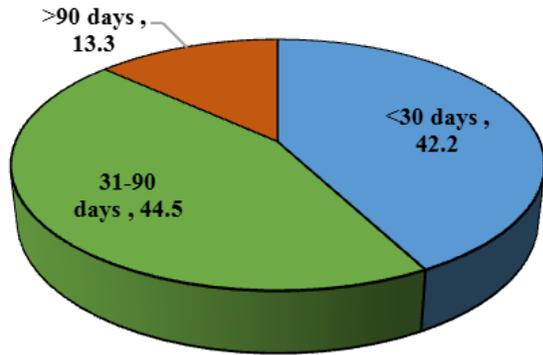
Gender	Frequency	Percent
Male	53	58.9
Female	37	41.1
Total	90	100.0



**Figure 1** Patient gender distribution.

**Table 2** Duration of disease at presentation.

Duration of disease at presentation	Frequency	Percent
< 30 Days	38	42.2
31 - 90 Days	40	44.5
> 90 days	12	13.3
Total	90	100.0



**Figure 1** Duration of disease at presentation.

**Table 3** Complete disappearance of lesions in 2 months.

Outcome	Frequency	Percent
Yes	83	92.2
No	7	7.8

The patients were further stratified according to duration of symptoms at presentation. As shown in **Table 3**, majority (44.4%) of the patients presented with in 31-90 days after the appearance of disease. A second peak (42.2%) was seen in the first 30 days while only 12 (13.3%) patients presented after 90 days. It has been further elaborated in in **Figure 2**.

Lesions were completely disappeared noted at the end of 2 months of treatment with 10% potassium hydroxide. 83 Patients (92.2%) completely responded to treatment while treatment failed in only 7.8% patients, all the patients were successfully followed and there was no drop out. These findings have been summarized in **Table 4**.

To determine the effect of duration of disease on treatment outcome (effect modifier), patient's disease duration was cross tabulated with

**Table 4** Duration of disease at presentation -complete disappearance of lesions in 2 months crosstabulation.

Duration of disease at presentation	Complete Disappearance of lesions in 2 Months		Total
	Yes	No	
< 30 days	35 (92.1%)	3 (7.9%)	38 (100%)
31-90 days	37 (92.5%)	3 (7.5%)	40 (100%)
> 90 days	11 (91.7%)	1 (8.3%)	12 (100.0%)
Total	83 (92.2%)	7 (7.8%)	90 (100.0%)

**Table 6** Chi-Square tests.

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.010a	2	.995
Likelihood Ratio	.010	2	.995
Linear-by-Linear Association	.000	1	.990
N of Valid Cases	90		

outcome as shown in **Table 5**. Efficacy was 92.1% among patients who presented with in first 10 days of appearance of disease, while it was 92.5% and 92.2% among those who presented between 31-90 days and more than 90 days after appearance of disease respectively. However, the difference was statistically insignificant ( $p=.995$ ) as shown in **Table 6**.

Molluscum contagiosum is a benign viral disease of pediatric age group, which resolves on its own in 6 months to several years. Conservative management is also an option; however, certain patients want it to be treated. Aim behind treating molluscum contagiosum in these patients may be due to cosmetic disfigurement, threat of autoinoculation, spread to other siblings, alleviation of itching in patients with an "molluscum eczema" and in patients with atopic dermatitis.

Treatment options include destructive therapies (cantharidin, keratolytics, curettage, cryotherapy), chemical non-destructive agents (potassium hydroxide), immunomodulators

**Table 7** Previous research data regarding efficacy of topical 10% potassium hydroxide.

Year	Author	Population	Sample size	Efficacy
1999	Romiti <i>et al.</i> [12]	Brazil	35	91.42%
2006	Short <i>et al.</i> [8]	Lebanon	10	70%
2008	Metkar <i>et al.</i> [7]	India	19	42.1%
2010	Seo <i>et al.</i> [9]	Korea	13	77%
2011	Muzaffar, Farhana[13]	Pakistan	40	94.1%
2012	Al-Hamdi & AL-Rahmani[14]	Iraq	125	82.1%
2014	Handjani <i>et al.</i> [15]	Iran	15	86.6%
2014	Can <i>et al.</i> [16]	Turkey	40	92.5%
2014	Current Study	Pakistan	90	92.2%

(cimetidine, imiquimod) and antivirals (cidofovir).

In this study, potassium hydroxide was used as a treatment modality because it is cheap, easily available and relatively easily tolerated by pediatric age group. It has alkaline nature and enters the skin due to its keratolytic effect and its effect is concentration dependent. 10% KOH was prepared as it was found to be more effective than 5% concentration.<sup>11</sup>

Efficacy of 10% potassium hydroxide has been investigated in many previous studies involving different populations. There exists a marked degree of discrepancy in the results among different such studies. In **Table 7**, where some studies claim it to be highly effective (91.42%-94.1%),<sup>12,13,16</sup> others have found it to be moderately effective (70% - 86.6%),<sup>8,9,14,15</sup> still others to report it quiet in-effective (42.1%).<sup>7</sup> Also no concrete data is available on its efficacy in Pakistani population. Therefore, purpose of the current study was to confirm the efficacy of 10% potassium hydroxide in Pakistani population.

In the present study children of age ranged from 2 to 6 years were enrolled because this disease is commonly seen in children and this age range is comparable with national and international studies.<sup>13,17,18</sup> This is evident from the results of indian study done by Laxmisha *et al.* in which among study population, 91.35% were children

and among children, 93% were below 10yrs of age.<sup>17</sup> In a study done by Muzaffar and Farhana 80% of the patients were younger than 8 yrs.<sup>13</sup>

In the current study, 58.9% were male and 41.1% were females which is comparable with Indian study which shows similar results.<sup>17</sup> However, no significant difference in the gender was appreciated in the previous studies.<sup>17,18</sup>

In the present study, the overall efficacy of topical 10% potassium hydroxide was observed to be 92.2% which matches closely with the previous studies involving Brazilian (Romiti *et al.*1999; 91.42%)<sup>12</sup> and Turkish (Can *et al.* 2014; 92.5%)<sup>16</sup> populations. There exist only 1 previous study in Pakistani population by Muzaffar and Farhana (2011)<sup>13</sup> who documented its efficacy to be 94.1% however, the sample size in this study was limited (40).

An important effect modifier identified early in this study was duration of disease before the application of treatment. There is a limited data available to see the relationship of this effect modifier on the outcome of treatment. On cross-tabulating duration of disease at presentation with the treatment outcome, it was found that efficacy was nearly the same among patients who presented after variable duration following appearance of disease; outcome was 92.1% when duration of disease was less than 30 days, 92.5% between 31-90 days and 92.2% when patient presented after 90 days. The observed

difference was statistically insignificant ( $p=0.995$ ) thus establishing efficacy to be unaffected by duration of the disease. Further comparative studies are required to see the effect of this factor on outcome of the treatment.

## Conclusion

Topical 10% potassium hydroxide is thus an effective treatment of molluscum contagiosum.

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