

Evaluation of Topical Potassium Hydroxide Solution for Treatment of Plane Warts

Hala E. Rezk and Mohamed Abd-Elwahed Gaber

Dermatology and Andrology Department, Faculty of Medicine, Menoufia University, Egypt
Halabkhr@gmail.com

Abstract: Objective: Evaluate the efficacy and tolerability of topical KOH solution in the treatment of plane wart. **Background:** Plane wart is a common dermatological disease that is caused by human papilloma virus; although the rate of spontaneous recovery is high, it usually takes a long time to occur. Many modalities of treatments have been used but none of them proved to be uniformly effective. Potassium hydroxide (KOH) solution is a well-known keratolytic agent with many dermatological uses. **Materials and Methods:** A total of 100 patients with plane warts, were enrolled in this opened therapeutic trial study. Patients were divided into two age and sex cross-matched equal groups; patients in group (A) were treated with topical 10% KOH solution once at night, while patients in group (B) were treated with topical 15% KOH solution once nightly. Only 42 patients from group (A) and 40 patients from group (B) completed the study, while the remainders were defaulted for unknown reasons. The patients were evaluated at second and fourth week to assess the cure rates and side effects, those patients who showed complete cure were followed up for 3 months to detect any recurrence. **Results:** At the end of second week, 66.7% of group (A) patients showed complete disappearance of their warts, vs 75% of group (B) patients. At the end of fourth week, 81% of group (A) patients showed complete response in comparison with 87.5% of group (B) patients. The side effects for the treating solution in both concentrations include itching, burning sensation, erythema, and temporary dyspigmentations, that were reported in 73.8% of group (A) patients in comparison with 90.5% of group (B) patients. Recurrence rate was reported in 11.9% of group (A) patients vs 5% of group (B) patients during the three months period of follow up. **Conclusions:** Topical KOH solution is proved to be an effective and safe treatment of plane warts in both concentrations (10% and 15%) with no important side effects.

[Hala E. Rezk and Mohamed Abd-Elwahed Gaber **Evaluation of Topical Potassium Hydroxide Solution for Treatment of Plane Warts.** *Stem Cell* 2017;8(2):71-75]. ISSN: 1945-4570 (print); ISSN: 1945-4732 (online). <http://www.sciencepub.net/stem>. 12. doi: [10.7537/marssj080217.12](https://doi.org/10.7537/marssj080217.12).

Keywords: Plane warts, potassium hydroxide, keratolytic agent

1. Introduction:

Warts are benign proliferation of skin and mucosa that result from infection with human papilloma virus (HPV) which are double stranded deoxyribonucleic acid (DNA) viruses. Wart occurs at any age but it is uncommon in infancy and early childhood.[1] The incidence increases in the school years to reach a peak between the age 12-16 years, then reduced sharply to the age of 20 years, and more gradually thereafter.[1] Infection with HPV may be latent, clinical or subclinical.[2] Plane warts are caused by HPV type 3 and 10, occur mostly in children and young adults. [3] The site of predilection is face, back of the hands, and the shins [4] usually lesion presented as 2 to 4 mm flat topped papules that are slightly erythematous or brown on pale skin and hypopigmented on darker skin.[5] there is the tendency of plane warts to koebnerize forming linear, slightly raised papular lesions.[5] warts may resolve spontaneously within one month, particularly when inflamed or it may stay for long time to resolve.[6] Many varieties of treatment were used to treat plane warts, but none is uniformly effective, these includes topical Salicylic acid, Imiquimod, 5Flourouracil, isotretinoingel 0.05%,[7] topical zinc sulfate

solution,[8] oral zinc sulfate,[9] cimetidine,[1] Bacillus CalmetteGuérin (BCG) vaccination,[10] curettage/electrodessication and cryotherapy.[1], to evaluate the efficacy and tolerability of topical KOH solution in the treatment of plane wart.

2. Materials and Methods

An opened therapeutic study where a total number of 100 patients with plane warts were enrolled in this study Inclusion criteria included patients with no specific age, both males and females, having plane warts whatever the site of them.

Exclusion criteria included patients who are receiving steroid or other immune suppressant drugs, those with history of chronic illnesses or immune suppressed conditions, pregnant and nursing woman, those who receive any modality of treatment for their warts at least for the previous two months, and patients refusing this therapeutic trial.

Formal consent was taken from each patient prior to their inclusion in this study; in addition, the approval of the ethical Committee of Scientific Council of Dermatology and Venereology of Egyptian ministry of health was also obtained.

For those patients, the following was done I. History taking including: age, sex, history of other types of warts, use of drugs and history of diseases.

II. Physical examination was done for each patient to assess the number, location of the lesions, size and presence of other types of warts.

The nature of the disease, course, prognosis, and full information related to the therapy including the possible side effects, action, and way of application were explained to the patients. Formal consent was taken from each patient prior to their inclusion in this study.

A solution of 10% w/v KOH was prepared by dissolving 100 g of KOH in one liter distilled water, while 15% w/v KOH was prepared by dissolving 150 g of KOH in one liter of distilled water. The patients were divided into two equal age and sex cross matched groups; for the first group, the patients were instructed to use 10% KOH solution topically once daily at night using a wooden probe sunken in the solution and making only one touch to the wart. In the second group, the patients were instructed to use 15% KOH solution topically once daily at night using the same method mentioned above.

All patients in the two groups were reexamined at the end of second week and fourth week to evaluate the response to treatment depending on clinical and photographic assessment and to record any possible side effects, The patients were considered as responder when there was complete disappearance of warts; however, if there was no change, the patients were considered as non-responder; if there is a decrease in the number of warts, the patients were considered as partial responder.

If complete response occurred at the end of second week, patients were followed up monthly for 3 months to detect any recurrence or persistent side effects, the follow-up is performed by monthly visit or by phone.

If at the end of second week, no or partial response occurred, the patients were instructed to continue using the same concentration of KOH solution once nightly and then they were reevaluated at the end of fourth week; if complete response occurred, the patients followed up for 3 months as mentioned above, if no response occurred, they were considered as treatment failure.

Statistical analysis

Statistical analysis of the data were calculated by IBM SPSS V24 programme with a descriptive statistics like Range, mean, median, SD (standard deviation) together with analytic statistics like Chi-squared test, t-test, or Z-test test have been done when appropriate.

3. Results

A total of 100 patients Were included in this Study, they were divided into two age & sex cross-matched equal groups; each group included 50 patients.

Group A

From 50 patients, only 42 patients (84%) completed this study; the remainders were regarded as defaulters.

This group comprised of 14 (33.3%) males and 28 (66.6%) females with male to female ratio of 1:2. Their ages ranged from 4 to 22 years (mean=1.6667). The number of warts in each patient ranged from 1 to 9 (mean =2.9286).

Table 1. Number of warts Group A

No. of warts	No. of patients	Percentage
1	11	26.2%
2	7	16.7%
3	6	14.3%
4	4	9.5%
Multi > 4	14	33.3%
Total	42	100%

All of these warts were located on the face, hands and legs, the duration of the lesions ranged from two weeks to 24 month, (mean=7.17).

Group B

Of 50 patients, only 40 patients (80%) completed this study; the remainders were defaulted for unknown reasons.

This group comprised of 15 (37,5 %) females and 25 males (62,5 %), with a male to female ratio of 1,66 to 1, their ages ranged from 6 to 68 (mean = 1.6250).

The number of warts in each patient ranged from 3 to 8. (mean=3.3).

Table 2. Number of warts in Group B

No. of warts	No. of patients	Percentage
1	5	12.5%
2	6	15.0%
3	11	27.5%
4	6	15.0%
Multi > 4	12	30.0%
Total	40	100%

All of these warts were located on the face, hands and legs, the duration of the lesions ranged from 2 months to f 18 months with a mean duration of (8.5).

As it is mentioned above, both groups comparable with respect to different independent variables including age, sex, number and duration of

lesion, where all p values between the two groups were statistically significant ($p > 0.05$).

Cure rates at the end of second and fourth week of treatment:

Group A, 28 patients shows response (66.7%) after two weeks, and after four weeks 34 patients shows response (81%),

On the other hand, Group B, 30 patients show response (75%) after two weeks, and after four weeks 35 patients show response (87.5%).

Table 3. Response to treatment after 2 weeks and 4 weeks.

		Group A		Group B		
Response to treatment	No	8	19.0%	5	12.5%	
	yes	2 weeks	28	66.7%	30	75.0%
		4 weeks	34	81%	35	87.5%
Total		42	100%	40	100%	

The difference in the cure rate for patients showing complete disappearance of their warts was not statistically significant between the two groups at the end of therapy ($P = 0.05$).

This study showed that there is insignificant association between the duration of warts and the cure rate, i.e., lesions with long duration were responding to treatment similar to newer ones. In addition, patients with smaller number of warts showed a better response to treatment in comparison with patients with larger number.

Regarding side effects, 31 patients (73.8%) from group (A) and 36 patients (90%) from group (B) showed local side effects to the treating substance. These side effects include itching, burning sensation, erythema, and dyspigmentation (hypo or hyperpigmentation).

In group (A) patients, itching (15 patients, 48.3%) and burning sensation.

8 patients, (25.8%) were the commonest side effects recorded, in contrast to patients in group (B), where burning sensation (14 patients, 38.8%) and dyspigmentation (10 patients, 27.7%). (see Table 4).

Table 4. Side effect to the treatment in the two groups at the end of fourth week.

Side effect		Group A	Group B	Total
No side effect	No. (%)	11 (26.2%)	4 (10%)	15 (18.2%)
Itching	No. (%)	15 (48.3%)	7 (19.4%)	23 (28%)
Erythema	No. (%)	6 (19.3%)	5 (13.8%)	11 (13.4%)
Burning	No. (%)	8 (25.8%)	14 (38.8%)	22 (26.8%)
Dyspigmentation	No. (%)	2 (.06%)	10 (27.7%)	12 (14.6%)

P = 0.0001

where the most common local reactions reported, The side effects that were caused by 15% KOH solution were more common than that reported among patients using 10% KOH with a statistically significant difference ($P=0.05$).

During 3 months period of follow-up, the warts in five patients of 42 patients in group (A) who showed complete response recurred, in comparison with 2 patients of 40 patients in group (B).

Accordingly, the relapse rate in the group (A) was 11.9% vs 5.0% in group (B), statistically the difference was not significant ($p = 0.05$).

Table 5. Relapse to treatment.

		Group A		Group B	
Relapse	Yes	5	11.9%	2	5.0%
	No	37	88.1%	38	95.0%

4. Discussion

Warts are typically hard, small and rough growths that are similar in color to the rest of the skin. They typically do not result in symptoms except on the bottom of the feet where they may be painful. While they usually occur on the feet and hands they can also affect other locations. One or Warts are caused by HPV which is a non-enveloped DNA virus, The course of human papilloma virus infection varies considerably, some lesions grow rapidly, some persist without any change, some regress spontaneously over several weeks, while others regress over long period there are many types of warts which include common wart, plane warts, filiform warts, planter warts, anogenital warts and periangular warts.

Cutaneous warts are one of the most common dermatoses in children, the prevalence of cutaneous warts among school children in Egypt is variable from 2.4% to 33%, with an equal frequency in both sexes, and the prevalence of warts for both children and adults range from 5 to 20%.

Plane warts mainly due to HPV-3 and HPV-10. Smooth, flat or elevated and are usually skin-colored or grayish-yellow, but may be pigmented reduction of the papillomatous features of the common warts makes the surface smoother and gives the aspect of verruca- vulgaris plane.

They are round or polygonal in shape and vary in size from 1 - 5 mm or more in diameter. The face and the backs of the hands and the shins.

Numbers range from 2 to many hundreds, may coalesce and a linear arrangement in scratch marks is characteristic feature inflammation in the lesions causing itch, erythema and swelling. Depigmented haloes may appear around the lesion.

There are many modalities of therapy to treat plane warts reflecting that none is uniformly effective or directly antiviral. Whatever method is used in the treatment of warts, there will be failures and recurrences. These include topical Salicylic acid, Imiquimod, 5-Fluorouracil, Isotretinoin gel 0.05%, topical zinc sulfate solution, oral zinc sulfate, cimetidine, Bacillus Calmette-Guérin (BCG) vaccination, curettage/ electrodesiccation cryotherapy and KOH the subject of our study.

Potassium hydroxide (KOH) is a strong alkali and well-known keratolytic agent with many dermatological uses, it has been found to be effective, safe, and well tolerated in the treatment of different dermatoviruses, This is due to its ability to dissolve keratin and penetrate deeply the skin, Furthermore, treatment is generally well tolerated and does not entail systemic side effects. The present study aimed to determine the efficacy and tolerability of topical KOH solution for treatment of plane warts.

This study showed that topical KOH solution in 10% and 15% concentrations is an effective treatment of plane warts as regards 28 patients from Group A showed response (66.7%) after two weeks, and after four weeks 34 patients showed response (81%), on the other hand, 30 patients showed response (75%) of group B after two weeks, and after four weeks 35 patients showed response(87.5%).

The mechanism by which KOH solution is supposed to act is mostly related to its keratolytic effect that leads to destruction of virus infected cells and also probably attributed to its irritating effect that induce inflammatory response and inflammatory reactions, so causing resolution of warts. In this study, it has been also shown that topical 10% KOH solution showed a slower action in comparison with 15% KOH solution, which was clearly noted from the high significant difference in the rate of complete response at the end of second week of treatment, but large number of patients who used 10% KOH showed partial response, which means that they needed additional time to show complete disappearance of the treated warts which was actually achieved at the end of fourth week, that is slightly lower than that induced by using 15% concentration, but statistically, the difference between both groups is in significant.

This study showed that there is insignificant association between the duration of warts and the cure rate, i.e., lesions with long duration were responding to treatment similar to newer ones.

In addition, patients with smaller number of warts showed a better response to treatment in comparison with patients with larger number.

This study showed also that patients with smaller sizes of wart respond better and faster with KOH solutions which may be also due to better immunity in this group in comparison with those with bigger sizes of warts where the immunity whose supposed to be suppressed, also better patient's compliance with small size of warts as it respond better to the keratolytic effect of KOH and inflammatory reactions induced by it.

Regarding side effects, 31 patients (73.8%) from group (A) and 36patients (90%) from group (B) showed local side effects to the treating substance. These side effects include itching, burning sensation, erythema, and depigmentation (hypo- or hyperpigmentation).

During three months of follow up, the relapse rate in the group (A) was 11.9% vs 5.0% in group (B), statistically the difference was not significant ($p=0,05$).

Some patients had other associated types of warts and used KOH as well, they showed promising response especially small size warts which may give

an idea about KOH as a very acceptable treatment of warts in general, but that still needs further studies.

Conclusions

Topical KOH solution was found as an effective and safe treatment of plane warts, besides that, 10% KOH solution is as effective as 15% KOH solution with fewer side effects, but it required longer period of treatment in comparison with 15% KOH solution.

References

1. Sterling JC. Virus infections. In: Rooks TB, Tony B, Stephen B, Neil C, editors. *Textbook of Dermatology*. 7th ed. Vol. 2. Italy: Blackwell Publishing Company; 2004. pp. 25.37–25.54.
2. Richard C, Reichman. Human papilloma virus infections. In: Braunwald E, Isselbacher KJ, Petersdorf RG, Wilson JD, editors. *Harrison's principle of Medicine*. 16th ed. Vol. 169. New York: McGrawHill Company; 2005. pp. 1056–8.
3. Lowg DR, Androphy EJ. Warts. In: Fitzpatrick TB, Freedberg IM, Elison AZ, Wolffk, Austen KF, Goldsmith LA, editors. *Dermatology in General edicine*. 7th ed. New York: McGrawHill Book Company; 2008. pp. 1915–23. ch. 196.
4. Kirnbauer R, Lenz P, Okun MM. Human papillomavirus. In: Bologna J, Jorizzo J, Rapini RP, editors. *Dermatology*. 2nd ed. Missouri: Mosby; 2008. pp. 1183–98. ch. 12.
5. James WD, Berger TG, Elison DM. In: *Andrew's Diseases of the skin, Clinical Dermatology*. 10th ed. Vol. 19. Canada: WB Saunders Company; 2006. Viral diseases; pp. 403–13.
6. Hunter JA, Savin JA, Dahl MV. *Clinical Dermatology*. 4th ed. Vol. 16. New Jersey: Blackwell Publishing Company; 2008. pp. 235–9.
7. Salih HR, Fadeel BM. Evaluation of isotretinoin gel and oral zinc sulphate in the treatment of plane warts. *J Faculty Med Baghdad*. 2008;50:4.
8. Sharquie KE, Khorshid A, AlNuaimy AA. Topical zinc sulphate solution for treatment of viral warts. *Saudi Med J*. 2007;28:1418–21.
9. Al Timimi TH. Oral zinc sulphate in the treatment of anogenital warts among Iraqi females: A thesis submitted to the Iraqi Board for Medical Specializations. *Dermatol*.
10. Sharquie KE, AlRawi JR, AlNuaimy AA, Radhy SH. BCG immunotherapy of viral warts. *Saudi Med J*. 2008;29:589–93.
11. Brodell RT, Helms SE, Snelson ME. Office dermatology testing: The potassium hydroxide preparation. *Am Fam Physician*. 1991;43:2061.
12. 1/30/2017 Evaluation of Topical Potassium Hydroxide Solution for Treatment of Plane Warts <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3312655/> 8/8.
13. Lourerio WR. Male genital wart treatment with 5% KOH. *Br J Dermatol*. 2008;158:172–203.
14. Romiti R, Ribeiro AP, Grinblat BM, Rivitti EA, Romiti N. Department of Dermatology, University of São Paulo, São Paulo, Brazil. Treatment of molluscum contagiosum with potassium hydroxide: Clinical approach in 35 children. *Pediatr Dermatol*. 1999;16:228–31.
15. 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.

5/11/2017