

EVALUATION OF TOPICAL 30% POTASSIUM HYDROXIDE VERSUS 30% TRICHLOROACETIC ACID IN THE TREATMENT OF PLANE WARTS

By

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ABSTRACT

Background: 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 that replicate inside the nucleus. Infection with HPV may be clinical, subclinical, or latent.

Objective: To compare the efficacy and safety of potassium hydroxide 30% (KOH) versus trichloroacetic acid 30% (TCA) in treatment of plane warts.

Patients and methods: Our study was carried out on 60 patients complaining of plane warts divided into A and B from November 2019 to March 2020, **Group A:** thirty patients treated by potassium hydroxide (KOH 30%) weekly and **Group B:** thirty patients treated by trichloroacetic acid (TCA 30%) weekly for maximum period of 12 weeks, with pointed end of a wooden applicator to the center of all the lesions until a white frost appeared. Patients were selected from out-patient clinic of Dermatology, Venereology and Andrology Department of Al-Azhar University Hospitals.

Results: The present study showed complete cure rates of 7 patients (23.3%) in group A and 7 patients (23.3%) in group B. Partial cure rates occurred in 15 patients (50%) in group A and 16 patients (53,3%) in group B after 12 weeks of treatment. No response occurred in 8 patients (27.6%) in group A and 7 patients (23.3%) in group B. All nonresponsive patients had lesions in sites other than face except for 2 patients, one in each group had facial lesions.

Conclusion: Based on our findings, both potassium hydroxide (KOH 30%) and trichloroacetic acid (TCA30%) are equally effective in treatment of plane warts without statistically significant difference at end of treatment period and follow up, but TCA (30%) was safer than KOH (30%).

Keywords: 30% Potassium Hydroxide, 30% Trichloroacetic Acid, Plane Warts.

INTRODUCTION

Warts are common epidermal growths caused by various strains of human papillomavirus (HPV) affecting all age groups. They have an unsightly appearance and are mostly asymptomatic but sometimes may be painful. The virus

initially targets the basal cells and undergoes a latent phase of slow replication. As the epidermis grows superficially, the virus induces hyperplasia and hyperkeratosis (Aldahan *et al.*, 2016).

There are five major HPV genera: Alpha papilloma virus, Beta papilloma virus, Gamma papilloma virus, Mu papilloma virus and Nu papilloma virus. HPVs infect epithelial cells in genital mucosa (alpha papilloma viruses only), while oral mucosa and skin by all the five genera (*Bzhalava et al., 2013*).

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 (*Kasim et al., 2013*), and the prevalence of warts for both children and adults range from 5 to 20% (*El Mohamady et al., 2014*).

Flat warts are associated with HPV types 2, 3, 10, 27, 28, 38, 41 and 49. These are found in the peripheral areas of the face, back of the hands and pretibial areas in children and youths. Linear grouping is typical following scratch lines (isomorphism or koebnerization) (*Cardoso and Calonje, 2011*).

Treatment of warts represents a continuing challenge for dermatologists as many of the available therapeutic modalities are associated with unsatisfactory results and high recurrence rates (*Saini et al., 2016*).

Potassium hydroxide (KOH) is a strong base used in the diagnosis of fungal infections, treatment of male genital warts, and treatment of molluscum contagiosum in children (*Camargo et al., 2014*).

KOH (5% and 10%) solution acts by its keratolytic effects that lead to the destruction of virus-infected cells causing resolution of warts. It is less irritating, less

painful, less scar forming, and can be safely used in children too. Rarely, side effects such as itching, erythema, and dyspigmentation may be seen (*Al-Hamamy et al., 2012*).

Trichloroacetic Acid (TCA) is a topical destructive agent and causes hydrolysis of cellular proteins leading to cell death. It is effective in treating common, cervical, genital, and anal warts in the concentrations of 70–80% and has response rates comparable to cryotherapy (*Pezeshkpoor et al., 2012*).

The aim of this work was to compare the efficacy and safety of potassium hydroxide 30% (KOH) versus trichloroacetic acid 30% (TCA) in treatment of Plane warts.

PATIENTS AND METHODS

This study was carried out on a total of 60 patients with plane warts from November 2019 to March 2020. The patients were diagnosed by typical clinical findings. The patients were able to read and give consents. Patients under any other treatment modalities, with present or past history of herpes, with present or past history of keloid, pregnant and lactating females were excluded. Patients were selected from out-patient clinic of Dermatology, Venereology and Andrology Department of Al-Azhar University Hospitals.

All patients were subjected to complete medical history, dermatological examination and documented digital photography.

The patients were divided into two equal groups:

Group A: KOH 30% group was subjected to weekly application of (30%) KOH solution by wooden stick after applying a thin film of vaseline petrolatum around the lesions till the complete clearance or a maximum period of 12 weeks.

Group B: TCA 30% was subjected to weekly application of (30%) TCA solution by wooden stick after applying a thin film of vaseline petrolatum around the lesions till the complete clearance or a maximum period of 12 weeks.

Response to treatment:

- i. Complete response: total clearance of warts.
- ii. Partial resolution: noticeable improvement but not full clearance.
- iii. No response: absolutely no improvement.

Follow-up of patients was done every 2 weeks for 2 months to detect any recurrence. The side effects of treatment were recorded such as erythema, burning sensation, hypopigmentation, hyperpigmentation and Scar Formation.

Statistical analysis:

Results of the present study were statistically analyzed using SPSS 25 (IBM, USA). Data were represented as median (interquartile range) or number and percentage. Numerical data were compared using Mann-Whitney U test, while categorical data were compared using Fisher's exact test or Chi-square test as appropriate. ROC curve was used to evaluate the performance of different tests differentiate between certain groups. P value < 0.05 was significant.

RESULTS

Regarding demographic data, there was no statistically significant difference between both groups regarding age, sex, duration of lesions and previous treatments.

The findings of our study regarding male to female ratio (56:44%), median

age group affected (11-13.5). the most of plane warts lesions were facial in 46 patients (76.6%), 6 patients (10%) had lesions in the neck, 7 patients (11.65%) had lesions in the upper limb and one patient (1.7%) had lesions in the trunk (Table 1).

Table (1): Comparison between studied groups as regard demographic data

Demographic data	Groups	KOH (N = 30)		TCA (N = 30)		Stat. test	P-value	
	Mean ±SD	Median	Mean ±SD	Median				
Age (years)	Mean ±SD	14.3 ± 7.3		15.6 ± 7.3		MW	379	0.293
	Median	11		13.5				
Sex	Male	15	50%	19	63.3%	X ²	1.08	0.297
	Female	15	50%	11	36.7%			
Duration (month)	Mean ±SD	24.2 ± 17.9		19.7 ± 13.9		MW	398.5	0.443
	Median	23		16				
Previous TTT	No	6	20%	1	3.3%	X ²	4.04	0.044
	Yes	24	80%	29	96.7%			

Regarding response to treatments, both treatments were effective with no statistically significant difference between both studied groups as regard response. This study showed complete cure rates in 7 patients (23.3%) in Group A, 7 patients (23.3%) in Group B and partial cure rates in 15 patients (50%) in group A, 16

patients (53,3%) in Group B after 12 weeks of treatment.

No response occurred in 8 patients (27.6%) in Group A and 7 patients (23.3%) in Group B, all nonresponsive patients had lesions in sites other than face except 2 patients one in each group had facial lesions (**Table 2**).

Table (2): Comparison between studied groups as regard response

Response		Groups		KOH (N = 30)		TCA (N = 30)		Stat. test		P-value
		No response	Partial response	Complete response	No response	Partial response	Complete response			
1 st month	No response	13	43.3%	9	30%	X ²	1.3	0.517		
	Partial response	16	53.3%	19	63.3%					
	Complete response	1	3.3%	2	6.7%					
2 nd month	No response	8	26.7%	8	26.7%			1.0		
	Partial response	17	56.7%	17	56.7%					
	Complete response	5	16.7%	5	16.7%					
3 rd month	No response	8	26.7%	7	23.3%	X ²	0.1	0.952		
	Partial response	15	50%	16	53.3%					
	Complete response	7	23.3%	7	23.3%					

Regarding to relation between response and (sex & duration) in KOH group, there was no statistically significant relation. There was a statistically significant relation complete response was more evident with younger age (10.1 ± 3.8 years) as compared to partial response (13.5 ± 7.5 years) and no partial response

(19.3 ± 6.9 years). Regarding to relation between response and site of lesion in KOH group, there was a highly statistically significant relation as complete and partial responses were more evident in face (100%) as compared to no response (12.5% in face, 50% in neck and 37.5% in the upper limb) (**Table 3**).

Table (3): Relations between response and other studied parameters in KOH group

Response		No (N = 8)		Partial (N = 15)		Complete (N = 7)		Stat. test		P-value
KOH group		No	%	Partial	%	Complete	%			
Sex	Male	3	37.5%	6	40%	6	85.7%	X ²	4.67	0.097
	Female	5	62.5%	9	60%	1	14.3%			
Site	Face	1	12.5%	15	100%	7	100%	X ²	25.1	<0.001
	Neck	4	50%	0	0%	0	0%			
	Upper limb	3	37.5%	0	0%	0	0%			
Age (years)	Mean±SD	19.3 ± 6.9		13.5 ± 7.6		10.1 ± 3.8		F	3.6	0.041
Duration (month)	Mean±SD	23.3 ± 9.8		26.7 ± 22.9		19.8 ± 13.3		F	0.34	0.710

Regarding to relation between response and (sex, age & duration) in TCA group, there was no statistically significant relation (**Table 4**).

There was a highly statistically significant relation as complete and partial responses were more evident in face (100%) as compared to no response (0%

in face, 28.6% in neck, 57.1% in the upper limb & 14.3% in trunk) (Table 4).

Table (4): Relations between response and other studied parameters in TCA group

TCA group		Response						Stat. test	P-value	
		No (N = 7)		Partial (N = 16)		Complete (N = 7)				
Sex	Male	5	71.4%	8	50%	6	85.7%	X ²	2.9	0.231
	Female	2	28.6%	8	50%	1	14.3%			
Site	Face	0	0%	16	100%	7	100%	X ²	30	< 0.001
	Neck	2	28.6%	0	0%	0	0%			
	Upper limb	4	57.1%	0	0%	0	0%			
	Trunk	1	14.3%	0	0%	0	0%			
Age (years)	Mean±SD	19.1 ± 8.6		16.3 ± 6.9		10.4 ± 4.1		F	2.9	0.068
Duration (month)	Mean±SD	14.7 ± 11.5		22.8 ± 15.5		17.7 ± 11.3		F	0.92	0.409

There was no statistically significance between both studied groups as regard erythema, burning sensation and hyperpigmentation, but there was a

statistically significant difference between both studied groups as regard hypopigmentation, in KOH group more than TCA group (Table 5).

Table (5): comparison between studied groups as regard side effects

Side effects		KOH (N = 30)		TCA (N = 30)		Stat. test		P-value
Erythema	No	0	0%	0	0%	----	----	----
	Yes	30	100%	30	100%			
Burning sensation	No	0	0%	0	0%	----	----	----
	Yes	30	100%	30	100%			
Hypopigmentation	No	11	36.7%	19	63.3%	X ²	4.3	0.039
	Yes	19	63.3%	11	36.7%			
hyperpigmentation	No	28	93.3%	30	100%	X ²	2.06	0.49
	Yes	2	6.7%	0	0%			



Figure (1): A 20 years old male with facial plane warts before and after treatment showing complete clearance after 4 weeks of KOH 30% application.



Figure (2): A 9 years old male with facial plane warts before and after treatment showing complete clearance with slight hypopigmentation after 4 weeks of TCA 30% application.

DISCUSSION

This study was carried out on 60 patients complaining of plane warts, 30 patients (Group A) were treated by KOH 30% weekly and 30 patients (Group B) were treated by TCA 30% weekly. All patients completed the study. Both modalities were effective and considered promising options in treatment of plane warts without statistically significant difference between both of them.

In this study, there was no significant difference between both groups regarding age, sex, duration and sites of lesions.

The present study showed complete cure in 7 patients (23.3%) in both groups (A and B) with partial cure in 15 patients (50%) in Group A, and 16 patients (53.3%) in Group B after 12 weeks of treatment. No response occurred in 8 patients (27.6%) in Group A, and 7 patients (23.3%) in Group B. All non-responsive patients had lesions in sites other than face except 2 patients, one in each group, had facial lesions. Both modalities did not give any response in neck, upper limb and trunk lesions. Recurrence occurred in 10 patients of Group A and 12 patients of Group B.

The reported side effects were mild burning sensation, transient erythema, hypopigmentation, hyperpigmentation. Side effects were equal in both groups except hypopigmentation which occurred in Group A more than Group B.

In literature, there are no studies about using KOH (30%) in treatment of plane warts.

In agreement with this study, *Yaghoobi et al. (2019)* compared the effect of (10%) KOH and (50%) TCA solutions in patients

with plane warts and found that both treatments were effective, and there was no significant difference between both groups in clinical response and side effects. They had more complete cure rates which may be due to the difference in quality of solutions, site of lesions and skin type of patients. In disagreement with this study, they found recurrence only in two patients in TCA group, that may be due to the difference in number, duration of lesions or the quality of solutions.

Jayaprasad et al. (2016) compared effect of (10%) KOH and (30%) TCA solutions in patients with plane warts and found that both treatments were effective, and there was no significant difference between both groups in clinical response which was in agreement with this study and had more complete cure rates which may be due to the difference in quality of solutions, site of lesions and the skin type of patients. They also found that hypopigmentation occurred in group treated with TCA (30%) more than those treated with KOH (10%) which was in disagreement of this study which may be due to the high concentration of KOH used in this study. There was no recurrence rate which may be due to the difference in number of lesions or the good immune response of patients.

In contrast to this study, *Al-Hamdi and Al-Rahmani, (2012)* compared the effect of (5%) and (10%) KOH on plane warts with once daily night application for 4 weeks and had more complete cure rates which may be due to the difference in treatment method which was once daily and all warts in were located on the face.

In agreement with this study, *Rezk et al. (2017)* compared the effect of daily application of KOH (10%) and (15%) on plane warts for 4 weeks and found that KOH is effective in both concentrations, but had more complete cure rates which may be due to the difference in treatment method which was once weekly in this study. In spite of the lower concentrations of KOH used, the side effects were in agreement with the present study which may be due to the daily application of KOH.

Pezeshkpoor et al. (2012) compared the effect of 80% TCA and 35% TCA on patients with plane warts once per week until complete clearance of the lesions or for a maximum duration of 6 weeks, and found that complete cure rates occurred in group treated by (80) TCA. However, this study had more cure rates which may be due to the difference in treatment period which was 12 in this study. In spite of the high concentration of TCA used, the side effects were in agreement with the present study which may be due to the difference in treatment period which was 6 weeks.

Both modalities were promising in treatment of plane warts, but immunotherapy was used to increase the efficacy and reduce the recurrence rate.

CONCLUSION

Both potassium hydroxide (KOH 30%) and trichloroacetic acid (TCA30%) were equally effective in treatment of plane warts without statistically significant difference at end of treatment period and follow up, but TCA 30% was safer than KOH 30%.

Conflicts of interest: no conflicts of interest were encountered.

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تقييم هيدروكسيد البوتاسيوم 30% مقابل حمض التريكلوروأسيستيك 30% في علاج الثآليل المسطحة

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خلفية البحث: تنتج الثآليل عن إصابة خلايا الجلد القرنية بفيروس الورم الحليمي البشري وتزداد نسبة الإصابة أثناء الطفولة لتصل إلى ذروتها في سن المراهقة وسن البلوغ المبكر ثم تنخفض بسرعة خلال العشرينات وبشكل تدريجي تسبب الثآليل المسطحة بسبب أنواع فيروس الورم الحليمي البشري 2، 3، 10، 27، 28، 41، 49 والتي تحدث في الغالب في الأطفال والشباب وأماكنها الشائعة هي الوجه وظهر اليدين والسيقان.

الهدف من البحث: تقييم فعالية وسلامة محلول هيدروكسيد البوتاسيوم (30%) مقابل حمض ثلاثي الكلورواسيتيك المحل (30%) في علاج الثآليل المسطحة.

المرضى وطرق البحث: هذه الدراسة تم تنفيذها على 60 من المرضى الذين حضروا إلى العيادة الخارجية للأمراض الجلدية بمستشفيات جامعة الأزهر خلال الفترة من نوفمبر 2019 حتى مارس 2020. وتم إخضاع جميع المشاركين أو ذويهم إلى أخذ التاريخ الشخصي والمرضي كاملا، وفحص جلدي يتضمن أماكن الثآليل المسطحة، والتقاط الصور قبل وبعد العلاج.

وقد تم تقسيم المرضى بالتساوي إلى مجموعتين: **المجموعة الاولى:** تم التعامل مع المرضى من خلال تطبيق هيدروكسيد البوتاسيوم (30%) موضعيا بواسطة عصا خشبية أسبوعيا حتى الشفاء التام أو لمدة 12 أسبوع. **المجموعة الثانية:** تم التعامل مع المرضى من خلال تطبيق حمض ثلاثي الكلورواسيتيك (30%) موضعيا بواسطة عصا خشبية أسبوعيا حتى الشفاء التام أو لمدة 12 أسبوع.

نتائج البحث: لم يكن هناك فرقا إحصائيا بين المجموعتين فيما يتعلق بالعمر والنوع ومدة العلاج والاستجابة للعلاج. وكان الفرق الإحصائي في مكان الإصابة حيث أن الاستجابة كانت في الوجه فقط، ولا توجد إستجابة في أي أماكن أخرى.

و بعد 12 أسبوعا من تطبيق العلاج على المجموعة الأولى تم التحسن الكامل في 7 من المرضى (23.3%)، والتحسن الجزئي في 15 من المرضى (50%)، ولا تحسن في عدد 8 من المرضى (27.6%). وفي المجموعة الثانية تم التحسن الكامل في 7 من المرضى (23.3%)، والتحسن الجزئي في 16 من المرضى (53.3%)، ولا تحسن في 7 من المرضى (23.3%).

وبالإشارة إلي الأعراض الجانبية فلا يوجد فرق إلا في نقص التصبغ وتكوين الندبات، والتي كانت أكثر في المجموعة الأولى. وبالإشارة إلي الانتكاس، فقد كانت النسب عالية في كلا المجموعتين بنسبة (45.5%) في المجموعة الأولى وبنسبة (52.2%) في المجموعة الثانية.

الاستنتاج: كلا المحلولين يمثلان علاجا واعداء في علاج التآليل المسطحة نظرا لتوفرهما ورخص ثمنهما مع التوصية باستخدام تركيزات أقل من هيدروكسيد البوتاسيوم لتجنب الأعراض الجانبية مع استخدام العلاج المناعي لزيادة نسب الشفاء وتقليل فرص الانتكاس.