A comparative study of liquid nitrogen versus potassium hydroxide in the treatment of common viral warts

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Abstract

Liquid nitrogen (LN) versus potassium hydroxide (KOH) for the treatment of common viral warts.

Introduction: In Sri Lanka, cryotherapy with LN is a first line treatment for common viral warts but is not widely available. Pain is a significant side effect.

Objective: To evaluate the safety and efficacy of KOH versus cryotherapy with LN.

Methodology: Consecutive patients with new warts randomly allocated to three groups: cryotherapy with LN, 5% KOH, 10% KOH. Response and side effects of 3 groups were compared at 8 weeks.

Results: No significant difference between LN versus 5% KOH (p=0.298) and 10% KOH (p=0.147). 10%KOH significantly better than 5% KOH (p=0.014). Pain experienced by 176 and of them 88 treated with N_2, 62 with 10% KOH and 18 with 5% KOH.

Conclusion: Both LN and KOH are equally effective for common viral warts. However, 10% KOH is more effective than 5% KOH though more irritant side effects are encountered with 10% KOH.

Introduction

Cutaneous warts are benign epidermal proliferations caused by a DNA-containing human papillomavirus (HPV). Common warts or verrucae vulgares represent about 70% of cutaneous warts. They are extremely common and occur mostly in young people[1].

The ideal treatment for viral warts should be simple, cheap, effective and free of side effects. There are several therapeutic options available for the treatment of common warts[2]. The usual first line treatment which as wart paint containing salicylic acid and/or lactic acid fulfill these criteria, but are slow to work, somewhat laborious and require a degree of perseverance. Cryotherapy, usually with liquid nitrogen, is another first line treatment where topical treatments are contraindicated or a second line treatment if topical treatments have been ineffective[2].

In Sri Lanka, cryotherapy with liquid nitrogen is commonly used as a first line treatment of viral warts[5]. But it is not widely available to people and is provided only through specialized skin centres due to lack of storage facilities in peripheral hospitals. Another main drawback of treatment is the pain associated with application.

On the other hand potassium hydroxide (KOH), a strong alkali, has been found to be effective, safe and well tolerated in the treatment of molluscum contagiosum in children, due to its ability to dissolve keratin and penetrate deeply in to the skin[6]. A study done in Brazil demonstrated that KOH is an effective, safe and low-cost treatment modality for genital warts in male patients[3,4]. But there is no published evidence of the use of KOH in the management of common warts. The aim of this study was to evaluate the safety and efficacy of cryotherapy with liquid nitrogen versus topical potassium hydroxide application in treating common viral warts and propose the use of KOH as a cost effective method in the treatment of common viral warts in resource poor settings.

Objective

To evaluate the safety and efficacy of cryotherapy with liquid nitrogen versus two strengths of topical potassium hydroxide application in treating common viral warts.

Study design

This is an interventional, comparative, randomized study carried out in a tertiary care centre. All patients with common viral warts attending the skin clinic were included in the study. Those who were already on treatment, those with genital or facial warts or with extensive widespread lesions were excluded. Children less than 3 years of age were also excluded due to poor tolerability of liquid nitrogen. Informed written consent was obtained from all participants; for patients below 18 years of age consent was obtained from their parents or guardians. Participants were randomly allocated to three groups. Group 1 was treated with cryotherapy with liquid nitrogen, group 2 with 5% KOH and group 3 with 10% KOH.

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Methodology

A clinical examination to determine the number of lesions, site of involvement and the type of warts was carried out after obtaining a detailed clinical history. The lesions were photographed with the permission of the participants.

Cotton bud method was used for all applications. When using liquid nitrogen one cotton bud was used for a single lesion to prevent cross infection. The liquid nitrogen was applied by keeping the cotton bud perpendicular to the wart till a frozen halo of 2 mm around the base of the wart appeared. One freeze-thaw cycle method was used.

Patients or their guardians received a demonstration how to apply KOH on every single lesion using a cotton bud. Application of KOH solution was con-tinued till the lesions showed signs of inflammation. At the end of week 2, week 4, week 6, and week 8, the number of lesions was counted and a photographic assessment was done to assess clearance. At each visit local reactions and systemic effects were noted prior to treatment. Patients who defaulted on two con-secutive visits and could not be contacted were withdrawn from the study. A wart was considered cured if it was no longer visible. Those who defaulted on a single visit were contacted over the phone to assess whether the warts were cleared and if cleared were taken as cured.

Results

Out of 300 patients 26 were non compliant and were excluded from the study. Hence, 274 patients were available for efficacy analysis and their ages ranged from three years to sixty years. In this study, 148 patients were male and 152 were females. Duration of existence of viral warts fell between 3 weeks to 10 years; sixty five (65) patients had a history of atopy. Out of all patients, 78 had a family history of atopy. Minimum number of viral warts observed was 1 and the maximum was 30.

At the end of the third visit, 27 (n = 91) patients treated with 5% KOH, 30 (n = 91) patients treated with 10% KOH and 30 (n = 92) patients treated with LN were cured.

At the end of the fourth visit, 63 (n = 91), 77 (n = 91) and 70 (n = 92) treated with 5% KOH, 10% KOH and LN respectively, were cured.

During the study period 13 patients treated with 5% KOH, 42 patients treated with 10% KOH and 4 patients treated with LN developed erythema. Sixteen patients treated with 5% KOH, 62 patients treated with 10% KOH and 88 patients treated with LN experienced pain. Only 6 patients developed blisters on the site of application of LN. Hypopigmentation developed in 16 patients who were treated with LN and one patient treated with 10% KOH (Table 1).

Analysis

Analysis was done using the Chi-square test. At the end of the third visit, there were no significant differences between the treatment methods. But at the end of the 4th visit though there were no significant differences between LN and either of KOH solutions (5% KOH or 10% KOH); there was a significant difference between 5% KOH and 10% KOH (Table 2).

Table 1. Response to different treatment modalities and their side effects

	Number of Patients	*3rd Visit Cured*	*4th Visit Cured*	*Erythema*	*Pain*	*Blisters*	*Hypopigmentation*
5% KOH	91	27	63	13 (14.2%)	16 (17.5%)	0	0
10% KOH	91	30	77	42 (46.1%)	62 (67.3%)	0	1 (1%)
LN	92	30	70	4 (4.3%)	88 (95.6%)	6 (6.5%)	16 (17.3)

Table 2. Significance of different treatment modalities

	P value 3rd visit cure	*P value 4th visit cure*
LN VS 5% KOH	0.668	0.298
LN VS 10% KOH	0.954	0.147
5% KOH VS 10% KOH	0.668	0.014

Discussion

We found cryotherapy (LN) and KOH (both 5% KOH and 10% KOH) to be equally effective in the treatment of common viral warts. There was no difference in their effectiveness. However, when comparing the efficacies of two strengths of KOH (5% and 10%), 10% KOH appeared to be more effective than 5% KOH.

KOH solution has advantages over LN being less traumatic, less painful and suited for self administration. These characteristics make KOH particularly helpful in the treatment of children. As it does not need storing facilities, it can be used even in resource poor settings. Considering these factors and the lower cost of KOH it appears to be a better option in the treatment of common viral warts.

KOH solution was self administrated daily at home, by the patient or by the parents. Low efficacy found with 5% KOH treatment could be due to the suboptimal concentration. Therefore, this study indicates that the concentration of KOH and frequency of application require further evaluation.

The only disadvantage of 10% KOH is its high irritancy potential as compared to 5% KOH. This can be minimized by educating the patients and the parents about the correct method of application, identification of early signs of irritancy and measures for prevention of irritation.

Side effects were common in both LN and 10% KOH. While pain was the commonest side effect of LN, few patients experienced hypopigmentation and blisters. Common side effects of KOH were pain and erythema. These side effects were comparatively low on patients treated with 5% KOH.

Most patients who were treated with LN complained of moderately severe pain compared to patients who were treated with KOH. However as we have not used a scale for pain assessment, pain analysis is not conclusive.

Further, in this study, since the observation period was limited to 8 weeks, reappearance of viral warts could not be assessed beyond that time frame.

Conclusion

Liquid nitrogen and KOH solution are equally effective in the treatment of common viral warts. In a developing country like Sri Lanka, KOH solution offers an affordable and efficient option even in resource poor settings. Ten percent KOH is superior to 5% KOH albeit with few more side effects.

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