

ORIGINAL ARTICLE

Comparison of Efficacy of 50% Salicylic Acid Versus Cryotherapy in the Treatment of Plantar Warts

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ABSTRACT

Aim: To find the comparison of efficacy of 50% salicylic acid versus cryotherapy in the treatment of plantar warts.

Methods: Total 85 patients with plantar warts were presented in this study. We divided patients in two groups. 43 patients of group A received 50% salicylic acid and 42 patients received cryotherapy in group B. Outcomes were compared.

Results: We found that both treatments were effective in treatment of plantar warts while salicylic acid showed good outcomes as compared to cryotherapy but statistically insignificant.

Conclusion: The findings demonstrate that both treatments are similarly effective in achieving wart clearance, with salicylic acid showing a slightly higher, though not statistically significant.

Keywords: Plantar warts, salicylic acid, cryotherapy.

INTRODUCTION

Plantar warts, medically referred to as verrucae plantaris, are benign lesions caused by an infection with the human papillomavirus (HPV). These lesions typically manifest on the soles of the feet and can vary in size and number. Due to the high prevalence of HPV in communal environments such as swimming pools, gyms, and locker rooms, plantar warts are common, particularly among children, young adults, and individuals with weakened immune systems. Although benign, these warts can cause significant discomfort, especially when they develop on weight-bearing areas of the foot, resulting in pain during walking or standing¹.

As a result, many patients seek treatment to alleviate symptoms and reduce the risk of spreading the infection to other parts of the body or to other individuals. The treatment of plantar warts presents a clinical challenge due to the varying response rates among patients, the persistence of lesions, and the potential for recurrence after initial resolution. Two of the most commonly used treatments for plantar warts are topical salicylic acid and cryotherapy, each with distinct mechanisms of action and treatment protocols. Salicylic acid, available in concentrations ranging from 17% to 50%, is a keratolytic agent that softens and dissolves the keratin in the wart. By gradually eroding the thickened skin, salicylic acid helps to expose the underlying viral-infected tissue, allowing the immune system to combat the infection. Cryotherapy, on the other hand, involves the application of liquid nitrogen to freeze the wart tissue. This extreme cold induces localized cell death, leading to the destruction of the wart and its eventual sloughing off. Both treatments are widely used in clinical practice, but there remains debate regarding their relative effectiveness, side effects, and patient satisfaction. Several studies have been conducted to compare the efficacy of salicylic acid and cryotherapy in the management of plantar warts, with varying results. Some research suggests that salicylic acid, when used consistently, offers a similar cure rate to cryotherapy, but with fewer side effects and lower treatment costs².

Cryotherapy, however, is often favored for its faster onset of action, with many patients experiencing resolution after just one or two sessions. Nevertheless, cryotherapy is associated with a higher incidence of pain, blistering, and potential scarring, making it less tolerable for some individuals, particularly children or those

with a low pain threshold. Understanding the advantages and limitations of both therapies is crucial for clinicians when making treatment recommendations based on the patient's clinical presentation, preference, and pain tolerance³.

In this study, we aim to compare the efficacy of 50% salicylic acid versus cryotherapy in the treatment of plantar warts, with a particular focus on key treatment outcomes such as the rate of wart clearance, treatment duration, recurrence rates, and patient-reported discomfort. By evaluating these factors, we hope to provide valuable insights that will assist in guiding clinical decision-making and improving patient outcomes. Specifically, we will examine whether one treatment modality consistently outperforms the other in terms of wart resolution and patient comfort, or whether both methods offer similar results, allowing for flexible treatment approaches tailored to individual patient needs. The choice of 50% salicylic acid for this study is based on its widespread availability and evidence suggesting higher concentrations may be more effective in treating recalcitrant warts⁴.

Cryotherapy, on the other hand, is one of the most popular in-office treatments performed by dermatologists and general practitioners for wart removal. Its rapid action and effectiveness in inducing local tissue necrosis make it a commonly used method for treating a variety of cutaneous lesions, including plantar warts. However, despite its popularity, cryotherapy is not without limitations. Treatment success may depend on factors such as the depth of freezing, duration of application, and the number of sessions required. Moreover, as mentioned earlier, the pain associated with cryotherapy may limit its use in certain patient populations⁵.

The main objective of the study is to find the comparison of efficacy of 50% salicylic acid versus cryotherapy in the treatment of plantar warts

METHODOLOGY

This study is designed as a randomized controlled trial to compare the efficacy of 50% salicylic acid versus cryotherapy in the treatment of plantar warts. Data were collected from 85 patients.

Inclusion criteria

1. Patients aged 18 to 65 years.
2. Patients with at least one plantar wart confirmed by a dermatologist.
3. Patients who had not received prior treatment for the current wart.

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4. Patients willing to comply with the study protocol and follow-up visits.

Exclusion criteria

1. Patients with immunocompromised conditions (e.g., HIV/AIDS, organ transplant recipients).
2. Patients with a history of recurrent warts after previous treatments.
3. Patients with hypersensitivity or contraindications to salicylic acid or cryotherapy.
4. Pregnant or lactating women.

Data collection: Upon enrollment, patients underwent a baseline evaluation, including a detailed medical history and a physical examination of the warts (size, number, location). Following this, patients were randomly assigned to one of two treatment groups:

Group A (Salicylic Acid Group): 43 patients received 50% salicylic acid. They were instructed to apply the acid daily at home to the wart. Before each application, the wart area was soaked in warm water for 5-10 minutes, and the dead skin was removed with a pumice stone or emery board. The treatment was continued for up to 12 weeks, or until complete clearance of the wart.

Group B (Cryotherapy Group): 42 patients received cryotherapy in the clinic, performed by a trained dermatologist. Liquid nitrogen was applied to the wart using a cryo-spray device for 10-15

seconds, ensuring that the entire wart and a small margin of surrounding tissue were frozen. The procedure was repeated every 2-3 weeks for up to 3 sessions, or until the wart was resolved.

The primary outcome measure was the complete clearance of the plantar wart, defined as the absence of visible wart tissue and no recurrence during follow-up

Patients in both groups were assessed at regular intervals throughout the treatment period. For the salicylic acid group, weekly phone calls were made to ensure compliance and monitor progress. For the cryotherapy group, follow-up visits occurred every 2-3 weeks to perform subsequent cryotherapy sessions if necessary. After treatment, patients returned for follow-up visits at 3 months and 6 months to assess wart recurrence. Data on wart clearance, treatment duration, and any adverse effects (e.g., blistering, pain, scarring) were recorded at each visit. The VAS was used to measure pain immediately after each treatment session in the cryotherapy group and after each weekly treatment for the salicylic acid group.

Statistical Analysis: Data were analyzed using SPSS v25. Recurrence rates were evaluated using Kaplan-Meier survival analysis, and a log-rank test was used to compare recurrence-free survival between groups.

RESULTS

Table 1: Baseline Demographic and Clinical Characteristics of Patients

Characteristic	Salicylic Acid Group (n=43)	Cryotherapy Group (n=42)	p-value
Mean Age (years)	34.6 ± 8.3	35.2 ± 7.9	> 0.05
Gender (Male/Female)	24/19	22/20	> 0.05
Mean Duration of Warts (months)	6.8 ± 2.1	7.1 ± 2.3	> 0.05
Average Size of Warts (mm)	8.5 ± 3.2	8.8 ± 3.0	> 0.05
Number of Warts (mean)	2.1 ± 1.3	2.4 ± 1.4	> 0.05
Wart Location (Weight-Bearing/Non-Weight-Bearing)	28/15	30/12	> 0.05
Previous Treatment (Yes/No)	5/38	4/38	> 0.05

Table 2: Comparison of Wart Clearance Rates

Treatment Group	Number of Patients (n)	Patients with Complete Wart Clearance (n)	Wart Clearance Rate (%)
Salicylic Acid Group	43	31	72.1%
Cryotherapy Group	42	29	69.0%

Table 3: Comparison of Treatment Duration

Treatment Group	Number of Patients (n)	Average Treatment Duration (Weeks)	Range (Weeks)
Salicylic Acid Group	43	10.5	7-12
Cryotherapy Group	42	5.2	3-9

Table 4: Comparison of Recurrence Rates at 6-Month Follow-up

Treatment Group	Number of Patients with Complete Clearance (n)	Patients with Recurrence (n)	Recurrence Rate (%)
Salicylic Acid Group	31	4	12.9%
Cryotherapy Group	29	6	20.7%

Table 5: Patient-Reported Discomfort (VAS Score)

Treatment Group	Number of Patients (n)	Mean VAS Score (0-10)	p-value
Salicylic Acid Group	43	2.5	< 0.01
Cryotherapy Group	42	6.7	< 0.01

DISCUSSION

This study aimed to compare the efficacy, treatment duration, recurrence rates, and patient-reported discomfort between 50% salicylic acid and cryotherapy for the treatment of plantar warts. The results demonstrated that both treatments were effective in achieving wart clearance, with no statistically significant difference in overall clearance rates between the two groups. For that matter, there were disparities in treatment length, symptom imposition, and the rate of relapse, which are crucial features used in making treatment decisions in the real world⁷.

Tumor clearance rates were presumably somewhat higher in the salicylic acid group than the cryotherapy group (72.1/69.0%). The results are in line with other existing research where both salicylic acid, and cryotherapy were well appreciated for their effectiveness in managing warts. Even though cryotherapy is considered more effective because of its invasive conduct, the

findings of this research imply that high-concentration salicylic acid takes the same results when applied frequently consistently. This is a factor of concern to both clinician and patient since salicylic acid is noninvasive, less costly and can be applied by the patient at home. It was also found that the amount of time taken in completely eradicating the wart was markedly different between the two treatments. The results indicate that cryotherapy was more effective in hastening the resolution in the psoriatic plaques with a mean treatment period of five-and-a-half weeks, compared with ten-and-a-half weeks for patients in the salicylic acid group. The reason that the cryotherapy was faster is that it freezes only the wart tissue at once which destroys all the wart tissue without a need for a keratolysis like salicylic acid to wear away. Thus, for the patients who demand the faster results in terms of the alleviation of the symptoms, as well as for the patients, who need the more intensive and faster removal of the warts, such as the athletes, or the people with the disposals of the foot pain in workplace, the

cryotherapy can be received as the preferable. In most cases recurrence is a significant problem of treatment since HPV can remain lurking in surrounding skin even after the visible wart has been disinfected. Comparing the recurrence rate in the present study, there was a higher 20.7% in the cryotherapy group than the 12.9% in the salicylic acid group but the difference was not significant. Such trend supports with other investigations that claim that the use of cryotherapy may not effectively eliminate the virions thus increasing the likelihood of reoccurrence⁸.

Thus, the efficacy of salicylic acid appears to be questionable due to the long-term exposure of body tissue to the chemical, while on the other hand the process of gradual excision of the wart layer by layer may give the body immune system more time to act upon the viral infection. For that reason, clinicians have to take this into account while explaining the outcomes of the treatment to the patients, because neither treatment provides full immunity from the recurrence of the symptoms. Perhaps the most important result of this research concerned the disparity of the perceived discomfort between the two therapies. Cryotherapy correlated with the marked increase in pain being evaluated at a mean VAS score of 6.7, as compared with the mean score of 2.5 in salicylic acid-treated patients⁹.

The common complaints manifested by the patients who underwent cryotherapy included pain, blister formation, and formation of mild scar that exacerbate the discomfort of the patients. This is in accord with the side effects of cryotherapy, where skin tissue destruction associated with freezing occurs. Another work comparing the efficacy of tretinoin and salicylic acid found that the latter was much better tolerated; mild skin irritation was reported by only few patients. These results suggest the patient comfort should be taken into consideration when selecting the method of the therapy, especially for the patient with the low pain tolerance or who do not want to undergo the surgery. There were serious side effects in the operation group, as compared to the cryotherapy group 23.8% patients complained of side effects from the procedure while it was only about 4.7% in salicylic acid group. The first adverse effects from cryotherapy involved formations of blisters, pains and minor scarring; attributed to this treatment method¹⁰.

On the other hand, the subjects in the salicylic acid group gave a lesser number of side effects hence considered safer for patients with issues to do with treatment side effects. The results of this study provided evidence that 50% salicylic acid as well as cryotherapy should each be considered following the same scientific therapy portfolio threshold for the treatment of plantar warts due to their similar effectuality. Nevertheless, these results for embryos less than 12 weeks old should be based on patients' preference and clinical indications. Therefore, for patients who agree to achieve the outcome earlier in time and can afford higher level of discomfort, cryotherapy seems more effective. On the contrary, for patients who are willing to bear a painful, costly, professional procedure they can effectively opt for salicylic acid though it will take a long time¹¹.

CONCLUSION

This study compared the efficacy, treatment duration, recurrence rates, and patient-reported discomfort between 50% salicylic acid

and cryotherapy in the treatment of plantar warts. The findings demonstrate that both treatments are similarly effective in achieving wart clearance, with salicylic acid showing a slightly higher, though not statistically significant, clearance rate. However, cryotherapy resulted in faster resolution, making it a preferable option for patients seeking rapid wart removal. On the other hand, salicylic acid was associated with significantly lower patient-reported discomfort and fewer adverse effects, making it a more tolerable and safer option for patients who prioritize comfort during treatment.

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1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
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All authors agree to be responsible for all aspects of their research work.

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