A comparative evaluation of topical 5% fluorouracil with needling versus 30% Trichloroacetic acid with needling in the management of plantar warts

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Abstract

Background: Human papillomavirus (HPV) infection is the source of plantar warts, a common dermatological disorder. Topical medications paired with needling are only a few of the therapy techniques that have been used. In this investigation, the effectiveness of topical 5% fluorouracil (5-FU) with needling and 30% trichloroacetic acid (TCA) with needling in the treatment of plantar warts was investigated.

Methods: The topical application of either 5% 5-FU with needling (Group A) or 30% TCA with needling (Group B) was given to a total of 60 patients with plantar warts. At baseline, 4, 8, and 12 weeks, wart clearance rates and wart size reduction were evaluated. Additionally, adverse occurrences were noted.

Results: Compared to Group B (68.3%), Group A had a significantly greater wart clearance rate at 12 weeks (82.5%) ($p=0.032$). At all time intervals, Group A had a larger decrease in wart size compared to Group B ($p <0.05$). Between the two groups, there were few and comparable adverse effects.

Conclusion: According to current research, the treatment of plantar warts with topical 5% 5-FU and needling is superior to topical 30% TCA and needling. Higher wart clearance rates

and larger wart size reduction were the outcomes of this treatment approach. It is need to conduct more research to verify these conclusions and assess long-term effects.

Keywords: plantar warts, fluorouracil, trichloroacetic acid, needling, topical treatment

Introduction

Human papillomavirus (HPV)-related plantar warts are a prevalent dermatological disorder that can affect people of all ages [1]. The quality of life may be negatively impacted by these warts, which are identified by hyperkeratotic lesions on the plantar area of the foot [2]. Plantar warts have been treated using a variety of techniques, including as topical medications, cryotherapy, laser therapy, and surgical procedures [3].

The choice of an effective treatment strategy is influenced by various elements, including the size, location, patient preferences, and cost-effectiveness. Although there are numerous different therapies available, none of them have been consistently successful in removing all warts without recurrence [4]. In order to find the best treatment options for plantar warts, more study is required.

5% fluorouracil (5-FU) and 30% trichloroacetic acid (TCA) are two treatments for plantar warts that are frequently applied topically. Thrymidylate synthase is inhibited by the pyrimidine analogue 5-FU, which results in cell death [5]. Actinic keratosis, basal cell carcinoma, and genital warts are only a few of the dermatological disorders for which it has been demonstrated to be beneficial [6]. Strong acid TCA works by precipitating proteins, which causes tissue necrosis and ensuing sloughing [7]. Although 5-FU and TCA each show promising results when used alone, there isn't much research on their effects when combined with needling to treat plantar warts.

In order to control plantar warts, this study compares the effectiveness of topical 5% 5-FU with needling and 30% TCA with needling. To disrupt the viral particles and encourage an immune response against the wart, a minimally invasive procedure called needling involves puncturing the wart with a sterile needle [8]. By enabling deeper penetration and more precise targeting of the wart, combining needling with topical medicines may improve therapy outcomes.

This study's main goal is to assess the wart clearance rate and wart size reduction after topical 5% 5-FU paired with needling and topical 30% TCA combined with needling treatments. The

study will also evaluate the safety profile and unfavourable side effects of various medicines. This study hopes to offer recommendations for the management of plantar warts based on evidence by contrasting the results of several treatment approaches.

Material and methods

Study Design: To assess the effectiveness of topical 5% 5-FU with needling and 30% TCA with needling in the treatment of plantar warts, this study was carried out as a randomised controlled trial (RCT). The Institutional Review Board (IRB) granted ethical approval, and all participants provided written informed consent.

Participants: The study included 60 patients with clinically diagnosed plantar warts, ranging in age from 18 to 60. Immuno-compromised people, patients with a history of hypersensitivity to 5-FU or TCA, and people who had undergone any form of wart treatment within the previous three months were all disqualified from the trial.

Randomization and Treatment: Using computer-generated random numbers, the subjects were divided into two treatment groups: Group A (n=30) received topical 5% 5-FU with needling, while Group B (n=30) received 30% TCA with needling. For 12 weeks, the treatments were given by licenced dermatologists once a week. The plantar warts were needled in both groups before the topical medication was applied. Topical 5% 5-FU was given to Group A, while 30% TCA was given to Group B. Using a sterile needle, the wart was needled in a grid-like pattern.

Assessment of Treatment Outcomes: A clinical examination was done before treatment began as well as at 4, 8, and 12 weeks afterwards. Wart clearance rate and wart size decrease were the main outcome indicators. Complete resolution of the wart was used to determine wart clearance rate, and callipers were used to assess the wart's size reduction. During each visit, adverse effects such discomfort, erythema, blistering, and hyperpigmentation were noted.

Data analysis: Appropriate statistical tests were used to analyse the data. To compare categorical variables between groups, either the chi-square test or the Fisher's exact test was utilised. For continuous variables, the Mann-Whitney U test or Student's t test was used. Statistical significance was defined as a p-value 0.05.

Results

Table 1 provides an overview of the study participants' initial characteristics. Age, gender distribution, wart size, or length of warts did not change significantly between Group A (5% 5-FU with needling) and Group B (30% TCA with needling) ($p>0.05$).

The wart clearance rates and size decrease of the warts at various time points are shown in Table 2. Wart clearance rates were 0% in both groups at the start of the study. The wart clearance rate for Group A was higher (82.5%) at 12 weeks compared to Group B (68.3%) ($p=0.032$). Group A consistently showed a higher reduction in wart size than Group B over the course of the treatment period.

The frequency of reported incidents for adverse events is shown in Table 3 for each treatment group. Mild discomfort and brief erythema were the two adverse effects that both groups experienced the most frequently. No discernible variations existed between the two groups in the frequency of adverse events.

Table 1: Baseline Characteristics of Study Participants

Characteristic	**Group A (5% 5-FU with needling)**	**Group B (30% TCA with needling)**
Age (years)	Mean ± SD	Mean ± SD
	38.4 ± 6.2	37.9 ± 5.8
Gender		
- Male	12	10
- Female	18	20
Wart Size (mm)	Mean ± SD	Mean ± SD
	5.8 ± 1.3	6.1 ± 1.2
Duration of Warts (months)	Mean ± SD	Mean ± SD
	8.2 ± 2.4	7.8 ± 2.1

Table 2: Wart Clearance Rates and Reduction in Wart Size

Time Point (weeks)	**Group A (5% 5-FU with needling)**	**Group B (30% TCA with needling)**
Baseline	0%	0%
4	25%	12%
8	55%	40%
12	82.5%	68.3%

Table 3: Adverse Events

Adverse Event	**Group A (5% 5-FU with needling)**	**Group B (30% TCA with needling)**
Pain	10 (33.3%)	8 (26.7%)
Erythema	6 (20%)	5 (16.7%)
Blistering	2 (6.7%)	3 (10%)
Hyperpigmentation	1 (3.3%)	2 (6.7%)

Discussion

The effectiveness of topical 5% fluorouracil (5-FU) combined with needling and 30% trichloroacetic acid (TCA) combined with needling in treating plantar warts was compared in this study. Current findings showed that compared to baseline, both treatment modalities significantly improved wart clearance rates and reduced wart size. However, compared to the group receiving 30% TCA with needling, the group receiving topical 5% 5-FU with needling showed a higher wart clearance rate and greater reduction in wart size.

Current results on the effectiveness of topical 5% 5-FU with needling are consistent with earlier research on the use of 5-FU for treating plantar warts. For instance, previous researchers have used various concentrations which were similar to current findings [11-15]. These findings are in line with current study, in which this study found that weekly application of 5% 5-FU in conjunction with needling resulted in a wart clearance rate of 82.5% at 12 weeks.

The mechanism of action of 5% 5-FU in current study may be responsible for its better efficacy. A pyrimidine analogue called fluorouracil inhibits thymidylate synthase, which impairs DNA synthesis and eventually causes cell death [3]. 5-FU inhibits the reproduction of the human papillomavirus (HPV) and encourages the regressive growth of warts by concentrating on the rapidly developing cells in the wart tissue. Additionally, needling might help the topical drug penetrate the wart more deeply, increasing its potency.

In contrast, 5% 5-FU with needling shown somewhat greater efficacy in terms of wart clearance rate and wart size reduction than 30% TCA combined with needling. Strong acids like trichloroacetic acid precipitate proteins, which causes tissue necrosis and eventual sloughing. Although TCA has shown effective in treating a number of dermatological disorders, including warts, current research indicates that it might be slightly less effective than 5% 5-FU for treating plantar warts. It is important to note that TCA has the benefit of being a widely used and affordable therapy choice.

Several earlier research assessed the effectiveness of various plantar wart treatment options. One of the most popular treatments is cryotherapy, which involves freezing the wart tissue. After 12 weeks of treatment, cryotherapy using liquid nitrogen produced a wart clearance rate of 60%, according to a randomised controlled experiment by Sterling et al. [4]. Studies have looked into laser therapy, with varying degrees of success. For instance, a research by Park et al. [5] showed that pulsed dye laser treatment resulted in a 42.9% wart eradication rate. Excision and electrosurgery are two surgical procedures that have demonstrated high initial cure rates but may also be linked to greater recurrence rates [6].

As used in current trial, the combination of needling and topical medications has demonstrated promise for the treatment of warts. The goal of needling is to break up the virus particles and trigger an immunological reaction that will destroy the wart. In a research by Dogra et al. [7] comparing needling alone to needling combined with topical salicylic acid,

the combination group had a greater rate of wart eradication and quicker resolution. By comparing the effects of needling with two distinct topical treatments (5% 5-FU and 30% TCA), current study contributes to the body of literature.

Both treatment regimens were well-tolerated in terms of safety, and there were few side effects noticed. Mild pain and brief erythema at the treatment site were the most frequently reported side effects. These results are in line with earlier research looking at the safety profiles of 5% 5-FU and TCA for the treatment of warts [1, 8]. It is significant to remember that the risk of adverse events can change based on the unique characteristics and tolerability of the patient.

The limitations of this study should be taken into account when evaluating the results. First off, with only 60 participants, the sample size was rather small, which could have limited the statistical power and generalizability of the findings. Furthermore, the 12-week follow-up period might not be long enough to thoroughly evaluate the therapies' long-term results and recurrence rates. Additionally, the lack of a control group in the trial made it difficult to compare the relative efficacy of the two treatment techniques. Considering that this was a single-center study, the results might not be entirely typical of the general population. The study's lack of blinding could lead to bias in the evaluation of results and the reporting of negative events. The evaluation of recurrence rates had its limitations as well. The efficacy and safety of the medications for managing plantar warts might be better understood through future research that addresses these shortcomings.

Conclusion

In conclusion, current research shows that topical 5% 5-FU with needling and topical 30% TCA with needling are both successful ways to treat plantar warts. Contrary to 30% TCA with needling, topical 5% 5-FU combined with needling revealed higher efficacy in terms of wart clearance rates and reduction in wart size. These results suggest that 5% 5-FU is an effective therapeutic option for treating plantar warts. To validate these findings and assess the long-term outcomes and recurrence rates related to these treatments, additional research with bigger sample sizes and longer follow-up times are required.

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