

## A COMPARATIVE STUDY OF SAFETY AND EFFICACY OF 30% FORMIC ACID WITH 85% FORMIC ACID IN THE TREATMENT OF PALMOPLANTAR WARTS

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### ABSTRACT

**Objective:** Warts are a common skin disease seen by dermatologists. It is an infection caused by different strains of human papilloma virus. The presence of various topical and systemic treatments for warts is a testament to the lack of a rapid, simple, uniformly effective, inexpensive, non-scarring, and painless treatment. The purpose of this study was to compare the safety and efficacy of 85% formic acid with 30% formic acid on palmoplantar warts.

**Methods:** A non-randomized, open trial was performed in 30 patients with common warts attending Father Muller's Medical College Hospital, Mangalore. 15 patients received 85% formic acid application, and 15 patients received 30% formic acid using a to puncture technique every day.

**Results:** About 73.3% in Group I and 73.3% in Group II showed disappearance of warts at the end of 3 months. No major side-effects were seen at the end of therapy in either group.

**Conclusions:** The results show that both 30% and 85% formic acid application are a safe, economical, and effective alternative in the treatment of common warts with few side-effects and 30% formic acid may be an effective replacement of 85% formic acid. A study with more number of patients is needed to see the efficacy of this treatment.

**Keywords:** Warts, Formic acid, Palmoplantar warts.

### INTRODUCTION

Common warts (*verruca vulgaris*), plantar warts (*verruca plantaris*), flat or planar warts (*verruca plana*), and genital warts (*condyloma acuminata*) are some of the clinical manifestations of human papillomavirus infection. Warts are estimated to occur in up to 10% of children and young adults. The range of greatest incidence is between 12 and 16 years of age. Warts occur with greater frequency in girls than in boys. The peak incidence is at 13 years of age in females and 14.5 years of age in males [1]. In India, various recent studies have shown that the incidence of warts represents 2.5±9% of patients attending a dermatology department [2-4]. In the present study, we used formic acid for the treatment of palmoplantar warts. Formic acid is a carboxylic acid. It is so named because it was first obtained by the distillation of red ants (Latin: *Formica* = ant). It is used in various industries [1,5,6].

Current available therapies for warts are Salicylic acid, available in a variety of formulations with or without additives such as lactic acid, cryotherapy with liquid nitrogen, destructive treatments such as topical acids, cantharidin, surgical excision, laser ablation, electrosurgery, virucidal therapies include imiquimod, interferons, bleomycin, cidofovir, acyclovir, 5-fluorouracil, tretinoin, podophylin, podophyllotoxin, formaldehyde, and glutaraldehyde, immunologic therapies like topical sensitizers, intra-lesional sensitizers. Alternative therapies include radiation, acupuncture, ultrasound, hypnosis, localized heat therapy, folk therapies, and homeopathy [7-11].

### METHODS

An open, non-randomized, comparative study was conducted on patients with palmoplantar warts who reported to the dermatology outpatient department of Father Muller Hospital, Mangalore

were included in the study. Ethical clearance was obtained from Institutional Ethics Committee. 30 patients (18 females, 12 males) were included in the study. Informed consent was obtained, and the need for regular follow-up was stressed. Patients were divided into two groups. Group I consisted of 15 patients (8 females, 7 males) treated with 85% formic acid application. Group II consisted of 15 patients (10 females, 5 males) treated with 30% formic acid. Patients with other systemic diseases were not included in the study. The warts were cleaned with a spirit-moistened cotton swab. Formic acid was applied using a tooth pick the tip of which was dipped in a bottle containing formic acid. This puncture was repeated 5-6 times on the same lesion. Care was taken to ensure that the puncture was not deep enough to produce bleeding and that there was no contact with normal skin. This form of treatment is called the "formipuncture technique." Warts in children were treated by application of formic acid with a cotton stick swab. All the patients were treated on alternate days until the lesions disappeared. The number of applications was restricted to 15, after which the treatment was considered to have failed. All patients were followed up once a month for a period of 3 months. The response to therapy, the appearance of new lesions, and the presence of secondary infection and other side-effects were noted.

### RESULTS

A total of 15 patients (males and females) received 85% formic acid application (Group I) and 15 patients (males and females) received 30% (Group II) for warts. The average duration of the disease was 6.24 months in Group I and 5.4 months in Group II. The average number of lesions in Group I was 2.73 (2.219 standard deviation [SD]) and in Group II was 5 (4.884 SD). In both groups, most patients had between one and five lesions, i.e. 86% in Group I and 73% in Group II. The sites of warts included the hands, feet, periungual region etc. The hands were the predominant site in both groups

(17/30), followed by feet (14/30). Many patients had involvement of more than one site. None of the patients developed any secondary infection. A mild burning sensation was observed in all patients at the time of application of formic acid, which disappeared within a few minutes. This stinging sensation was more in Group I when compared to Group II. Minimal scarring was seen after healing of lesions. No other side-effects were observed in these patients. Efficiency of

therapy was assessed at the end of 3 months of treatment: 73.3% in Group I (Figs. 1-4) and 73.3% in Group II (Figs. 5-10) showed the disappearance of warts.

**DISCUSSION**

In this study, formic acid application for warts was safe, effective and economical therapy with minimal side-effects. Among the various



**Fig. 1: Before application of 85% formic acid**



**Fig. 2: After 3 month**



**Fig. 3: Before application of 85% formic acid**



**Fig. 4: After 3 month**



**Fig. 5: Before application of 30% formic acid**



**Fig. 6: After 3 month**





Fig. 7: Before application of 30% formic acid



Fig. 9: Before application of 30% formic acid



Fig. 8: After 3 month



Fig. 10: After 3 month

caustic acids used in the treatment of common warts, salicylic acid is the weakest, trichloroacetic acid is of medium strength, and bichloroacetic acid is the strongest. Formic acid is stronger than salicylic acid but less caustic than trichloroacetic acid. In the field of dermatology, 8% formic acid has been shown to be useful as a post-pediculocide nit removal system [12]. The mechanism of action of salicylic acid in warts involves keratolysis of virally infected tissues [13]. Trichloroacetic acid and bichloroacetic acid are powerful irritants that work by hydrolyzing the cellular proteins, leading to inflammation and cell death. The exact mechanism of action of formic acid is not known. It probably acts in a manner similar to formalin which causes destruction of the wart-infected tissue by dehydration [14]. After application of formic acid, the wart becomes slightly whitish in color and the superficial layer peels off indicating a keratolytic effect. Formic acid puncture may also help in inducing regression of the warts. Regression of plane warts following spontaneous inflammation has been reported [15]. It is a relatively painless procedure, can be used in children, and also for the treatment of periungual warts. It does not require any local anesthesia and scarring is minimal. Use of 85% formic acid is one of the most commonly used topical therapies for the treatment of common warts. Bhat *et al.* and Shamsadhini *et al.* used 85% formic acid and showed cure rates of 92% and 81% respectively. In the study by Bhat *et al.* 12% of the patients developed secondary infection. The presence of pain following application of formic acid though transient can be bothersome symptom.

## CONCLUSION

In this study, we found that 30% formic acid has the same effect when compared to 85% formic acid after 3 months of treatment (73% cure rates in both. p value was not significant). Side-effects such as pain were more in Group I as compared to Group II. Hence, 30% formic acid may be considered as a replacement for 85% formic acid. Also, studies are needed to test the efficacy of the same over other body sites other than palmoplantar areas.

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