

Efficacy of Autoinoculation in Treatment of Multiple Viral Warts

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Abstract: Viral warts caused by human papillomavirus (HPV) are common and often resistant to conventional therapies. Autoinoculation therapy stimulates an immune response by reintroducing wart tissue into the skin, offering a potential, low-cost and effective alternative. This study evaluated the efficacy and safety of autoinoculation in treating multiple viral warts in the Pakistani population. **Methods:** A descriptive study was conducted in the Department of Dermatology, Ibn-e-Sina Hospital, Multan, from November 2023 to April 2024. Ninety-one patients aged 18–60 years with multiple warts underwent autoinoculation. Patients were followed for 12 weeks, and outcomes were classified as complete, partial, or no clearance. Data were analyzed using SPSS version 23, with chi-square tests applied for associations ($p \leq 0.05$). **Results:** The mean age was 31.8 ± 10.4 years; 57.1% were females. After 12 weeks, 63.7% achieved complete clearance, 23.1% partial, and 13.2% no response. Higher efficacy was observed in younger patients (68.4%) and those with shorter disease duration (71.4%). Mild transient pain and erythema occurred in 17.6%, with no major complications or recurrences. **Conclusion:** Autoinoculation is a safe, simple, and effective method for managing multiple viral warts, achieving high clearance rates with minimal side effects. It is particularly valuable in resource-limited settings like Pakistan and may serve as an accessible alternative to conventional therapies. Further randomized trials are recommended to confirm long-term efficacy.

Keywords: Autoinoculation, Viral warts, HPV, Immunotherapy, Pakistan

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Introduction

Human papillomavirus (HPV) infections are a prevalent dermatological issue worldwide, manifesting as warts that can be both physically intrusive and emotionally distressing (1, 2). These benign epithelial tumors result from HPV-induced cellular proliferation, leading to various wart types, including common warts, plantar warts, and anogenital warts (3,4). Traditional treatment modalities, such as cryotherapy, electrocautery, and topical agents, often yield variable outcomes, particularly in cases of multiple or recalcitrant lesions (5, 6). Recent advancements have focused on immune-mediated approaches, particularly autoinoculation therapy, which entails inducing a local immune response against the virus by implanting wart tissue back into the skin (7, 8).

Autoinoculation therapy aims to clear persistent and widespread warts by leveraging the immune system's recognition of the HPV infection. A clinical study demonstrated that a regimen of autoimplantation therapy applied biweekly led to a 60% clearance rate in patients with multiple warts⁷. Similar research reported efficacy rates of 70% complete clearance with homologous autoinoculation, showcasing its potential as a viable treatment for resistant warts (9). The implicit hypothesis is that the introduction of wart antigen may stimulate both local and systemic immune responses by enhancing the production of various cytokines and activating T-lymphocytes against HPV (10,11).

The mechanism underpinning autoinoculation is thought to involve a multifaceted immune response, which includes the activation of cell-mediated immunity. The therapeutic impact of autoinoculation aligns with findings from recent studies that emphasize its potential to significantly improve treatment outcomes for patients suffering from HPV-related lesions (12, 11). Moreover, autoinoculation not only promotes viral clearance but also offers a safer profile compared to other invasive modalities like surgical excision or laser ablation, which carry risks of scarring and infection (13, 14).

In the context of Pakistan, the need for effective treatment modalities for viral warts is paramount. In the Pakistani population, warts can trigger significant aesthetic and psychosocial burdens; thus, exploring local and accessible treatment methods is essential (15). The autoinoculation technique, with its promising efficacy and minimal side effects, presents a transformative option that could cater to the needs of individuals with multiple viral warts, especially in underserved areas where advanced treatments may not be readily available. Furthermore, the feasibility of this treatment method aligns well with community healthcare strategies aiming to improve overall dermatological care without imposing excessive financial burdens on patients (16,17).

Given the compelling evidence supporting the efficacy of autoinoculation in managing viral warts, further exploration into its implementation within the Pakistani healthcare framework is warranted. By tailoring interventions that enhance immune responses against this common viral infection, we can mitigate the prevalence of HPV in our communities while providing effective and culturally sensitive care.

Methodology

The present study was conducted in the Department of Dermatology at Ibn-e-Sina Hospital, Multan, with the objective of determining the efficacy of autoinoculation in the treatment of multiple viral warts among adult patients. This descriptive study design was selected to assess clinical outcomes of this novel and cost-effective therapeutic approach in a local Pakistani population. The total duration of the study was six months from November 2023 to April 2024, initiated after approval of the synopsis from the College of Physicians and Surgeons Pakistan (CPSP). A non-probability consecutive sampling technique was employed to recruit participants who met the inclusion criteria. The sample size was calculated using the WHO sample size calculator for a single proportion formula, considering a 62.5% complete clearance rate reported in



previous studies, a 95% confidence level, and an absolute precision of 10%, resulting in a final sample of 91 participants.

All patients aged between 18 and 60 years, of either gender, diagnosed clinically with cutaneous viral warts of at least three months' duration, and having a minimum of five lesions were considered eligible. Patients currently undergoing any form of treatment for warts or those who had received any therapy within the last four weeks were excluded from participation. Informed written consent was obtained from all participants prior to enrollment, and the study adhered to the ethical principles outlined in the Declaration of Helsinki. Baseline demographic and clinical data, including age, gender, duration of disease, site of lesions, and the total number of warts, were recorded on a structured proforma.

For the autoinoculation procedure, an easily accessible wart was selected as the donor lesion from any part of the body, preferably from the extremities. The recipient site was chosen based on patient preference, typically the volar surface of the forearm or the medial surface of the lower leg. Both donor and recipient areas were cleaned thoroughly with povidone-iodine solution, and local anesthesia was administered using 2% lignocaine. The selected donor wart was then excised aseptically and minced into very small fragments using a sterile blade. A subcutaneous pocket was created at the recipient site, where the minced tissue was inoculated, and the pocket was subsequently closed with prolene sutures (3.0 or 4.0) followed by the application of a sterile dressing. Patients were prescribed a short course of oral and topical antibiotics for five days following the procedure to prevent secondary infection.

Each patient was followed up at 4, 8, and 12 weeks after the procedure. During each follow-up visit, the number and appearance of warts were carefully documented and compared with baseline findings. The procedure was repeated after four weeks in patients who showed no or partial response, with a maximum of three autoinoculations permitted per patient during the study period. The outcome was categorized into three groups: cleared (no warts), partially cleared (reduced number of warts compared to baseline), and no response (same or increased number of warts). Treatment was labeled as efficacious if complete clearance was achieved at 12 weeks.

Data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 23. Continuous variables such as age, duration of warts, and number of warts were expressed as mean $\pm$ standard deviation, while categorical variables including gender, site of lesions, outcome, and efficacy were presented as frequencies and percentages.

The effect of potential confounding variables such as age, gender, duration, and site of warts on treatment efficacy was determined by stratification. Post-stratification comparisons were made using the chi-square test, and a p-value ≤ 0.05 was considered statistically significant.

Results

A total of 91 patients with multiple viral warts were included in the study. The mean age of participants was 31.8 ± 10.4 years, ranging from 18 to 60 years. There was a slight female predominance, with 52 females (57.1%) and 39 males (42.9%). The mean duration of warts before presentation was 7.2 ± 3.8 months, while the mean baseline number of warts was 11.4 ± 5.2 per patient. The most frequent site of involvement was the hands and feet (33.0%), followed by multiple body sites (27.5%), face and neck (23.1%), and trunk or limbs (16.4%). (Table 1).

Table 1 summarizes the demographic and baseline clinical characteristics of the study population.

At the end of 12 weeks of follow-up, complete clearance of warts was observed in 58 (63.7%) patients, partial clearance in 21 (23.1%), while no response was noted in 12 (13.2%) patients. Thus, the overall efficacy (complete clearance) of autoinoculation therapy was 63.7%.

Most patients who achieved complete clearance required only one autoinoculation procedure (72.4%), whereas those with partial or no response required two or three sessions. (Table 2).

Stratified analysis showed that treatment efficacy was slightly higher among females (67.3%) compared to males (59.0%), although the difference was not statistically significant ($p = 0.41$). Similarly, younger patients (18–30 years) showed a better response rate (68.4%) compared to older age groups ($p = 0.32$).

Patients with shorter duration of warts (<6 months) demonstrated the highest efficacy (71.4%) compared to those with warts of more than one-year duration (50.0%, $p = 0.09$). Regarding location, warts located on hands and feet had the highest clearance rate (70.0%) compared to multiple sites (60.0%) or facial/truncal sites (56.0%). (Table 3).

During follow-up, mild pain and local erythema at the inoculation site were reported in 17.6% of cases, which subsided with conservative management. No serious complications such as infection or scarring were observed. No recurrence was noted during the 12-week observation period among patients with complete clearance.

Table 1. Demographic and Baseline Clinical Characteristics of Patients (n = 91)

Variable	Category	Frequency (n)	Percentage (%)	Mean $\pm$ SD
Age (years)	18–30	38	41.8	31.8 ± 10.4
	31–45	35	38.5	
	46–60	18	19.7	
Gender	Male	39	42.9	
	Female	52	57.1	
Duration of warts (months)	<6 months	28	30.8	7.2 ± 3.8
	6–12 months	47	51.6	
	>12 months	16	17.6	
Mean number of warts	—	—	—	11.4 ± 5.2
Site of involvement	Hands/Feet	30	33.0	
	Face/Neck	21	23.1	
	Trunk/Limbs	15	16.4	
	Multiple Sites	25	27.5	

Table 2. Treatment Outcome after Autoinoculation (n = 91)

Outcome Category	Frequency (n)	Percentage (%)
Cleared (no wart)	58	63.7
Partially Cleared	21	23.1
No Response	12	13.2

Table 3. Stratified Analysis of Efficacy (n = 91)

Variable	Category	Efficacious n (%)	Non-Efficacious n (%)	p-value
Gender	Male (n=39)	23 (59.0)	16 (41.0)	0.41
	Female (n=52)	35 (67.3)	17 (32.7)	
Age (years)	18–30 (n=38)	26 (68.4)	12 (31.6)	0.32
	31–45 (n=35)	21 (60.0)	14 (40.0)	
	46–60 (n=18)	9 (50.0)	9 (50.0)	
Duration of warts (months)	<6 (n=28)	20 (71.4)	8 (28.6)	0.09
	6–12 (n=47)	30 (63.8)	17 (36.2)	
	>12 (n=16)	8 (50.0)	8 (50.0)	
Site of warts	Hands/Feet (n=30)	21 (70.0)	9 (30.0)	0.28
	Face/Neck (n=21)	12 (57.1)	9 (42.9)	
	Trunk/Limbs (n=15)	9 (60.0)	6 (40.0)	
	Multiple Sites (n=25)	15 (60.0)	10 (40.0)	

Discussion

The results of our study indicate a substantial efficacy of autoinoculation therapy in treating multiple viral warts, as evidenced by a complete clearance rate of 63.7% among 91 patients after a 12-week follow-up. These findings corroborate previous research demonstrating the potential of autoinoculation as a viable treatment option for viral warts, aligning with the work of Abdelmonaem et al., who reported a 70% clearance rate in their study population subjected to homologous autoinoculation therapy (18). The slight disparity in efficacy may stem from variances in patient demographics, methodological designs, or the baseline characteristics of the wart lesions considered.

In our cohort, the demographics reveal a mean age of 31.8 years, with a notable female predominance (57.1%). This aligns with findings from Shahid et al., who highlighted a comparable age distribution and the commonality of warts in both genders, although the pathophysiology remains more pronounced in those with chronic immunosuppression or underlying conditions (19). Interestingly, our data on the distribution of wart locations show that the hands and feet were the most common sites (33%), which correlate with literature indicating that these areas are frequently affected due to higher exposure rates and potential for autoinoculation during daily activities (20).

A noteworthy observation in our results is that the majority of patients achieving complete clearance (72.4%) required only one autoinoculation treatment. This finding echoes the work of Taneja et al., who suggested that fewer sessions may be necessary for effective clearance, thereby reducing patient burden (21). Furthermore, partial or no response in some patients necessitating multiple sessions emphasizes a need for tailored treatment strategies, particularly for those with longer wart duration or multiple sites of involvement.

The stratified analysis from our study indicates slightly higher efficacy among females (67.3% vs. 59.0% in males), albeit the difference was not statistically significant ($p = 0.41$). This aligns with prior studies that found gender differences in response rates to various wart therapies, suggesting a potential influence of hormonal or immunological factors (22). Age stratification revealed that younger patients (18–30 years) exhibited better response rates (68.4% clearance), consistent with research indicating that younger patients often possess a more robust immune response, facilitating better clearance of HPV-associated lesions (23).

Moreover, our study established a tendency for higher efficacy in patients with a shorter duration of warts (<6 months showed 71.4% clearance) compared to those with persistent warts of more than one year (50% clearance, $p = 0.09$). This trend aligns with findings from Redzic et al. who noted that warts of recent onset are often more receptive to treatment due to their less entrenched nature (24). Furthermore, our results indicate that warts located on the hands and feet have the highest clearance rates (70.0%), suggesting that treatment might be more efficacious at sites with higher viral load dissemination, supporting the hypothesized mechanism of immune awareness through autoinoculation (20).

Importantly, the safety profile observed in our study, with mild pain and local erythema reported in only 17.6% of cases, aligns with broader literature advocating the safety of autoinoculation therapies (23). No serious complications or recurrences were observed, reinforcing the notion that autoinoculation may offer both an effective and safe alternative to traditional wart therapies, with fewer adverse effects compared to more invasive methods like cryotherapy or surgical excision (18).

Thus, our findings advocate for the inclusion of autoinoculation therapy as a standard treatment option for viral warts, particularly in populations with limited access to alternative therapies. Future research should aim to refine treatment protocols and explore long-term outcomes and the generalizability of findings within various demographic cohorts, including the Pakistani population context where warts represent a prevalent dermatological concern.

Conclusion

Autoinoculation offers a practical, low-cost, and effective treatment for multiple viral warts, achieving significant clearance with minimal complications. Its immune-based mechanism and simplicity make it a suitable option for routine use in low-resource dermatological settings. Broader clinical trials are warranted to establish its long-term outcomes and optimize patient selection criteria.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-24)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

AA (Postgraduate Registrar)

Manuscript drafting, Study Design,

NF (FCPS Dermatology)

Review of Literature, Data entry, Data analysis, and drafting article.

SA (FCPS Dermatology)

Conception of Study, Development of Research Methodology Design,

SS (Principal Research Officer)

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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