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TREATMENT OF FACIAL WARTS IN YOUNG ADULTS: A COMPARATIVE REVIEW OF MINIMALLY INVASIVE THERAPEUTIC EFFECTIVENESS" – LITERATURE REVIEW

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ABSTRACT

Introduction and Aim: HPV inducted facial warts are a common disease among children, adolescents and frequently persist beyond adolescence into early adulthood. What distinguishes from other warts different region of body is high risk of spreading due to pubertal acne phase and excoriation or manipulation of acneiform eruptions.Occurrence of lesions at facial region often cause considerable psychological distress, contributing to social anxiety and feelings of shame linked to social exclusion. When establishing a treatment plan, it is essential to select a minimally invasive modality that avoids scarring or permanent tissue alteration, thereby excluding several therapies that may be effective in other anatomical regions. The aim of this work is comparison of minimally invasive therapeutic modalities in the treatment of HPV-induced facial warts in young adults.
Results: Phototherapy (Nd: YAG laser) offers the highest efficacy with minimal recurrence and excellent cosmetic safety in the treatment of facial warts. Systemic and topical retinoids, immunomodulatory agents (imiquimod, Candida antigen, HPV vaccine), and intralesional bleomycin also offer effective, minimally invasive treatment options and should be dose-adjusted to individual response.
Materials and Methods: reviewing recent literature published up to 10 years ago based of PubMED , Google scholar reaserch based of following key words: Facial Warts, young adult facial warts , facial plane warts, recalcitrant facial warts.

KEYWORDS
Facial Warts, Facial Plane Warts, Young Adult Facial Warts, Nd:YAG Laser, Minimally Invasive Therapy

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Introduction.

Skin warts are common in children, adolescents, and young adults, with peak incidence typically occurring in the second decade of life. Human papillomavirus (HPV) subtypes 3 and 10 are most commonly associated with warts on the facial and cheek areas. [1] [4] HPV lesions are highly contagious and often spread locally through minor trauma, such as scratching, leading to autoinoculation—a process sometimes referred to as the pseudo-Koebner phenomenon. [2] In acne-prone facial areas, frequent manipulation, such as squeezing pimples or touching the skin, further promotes local spread and can result in the development of large, highly visible, lobulated lesions. These lesions often cause considerable psychological distress in adolescents and young adults, contributing to social anxiety and feelings of shame.

Even after acne resolves, HPV-induced facial warts are frequently resistant to standard treatments and may persist for years. In pediatric populations, spontaneous resolution occurs in approximately 50% of cases within one year of diagnosis, 67% within two years, and up to 80% by four years. A Dutch study involving 366 schoolchildren diagnosed with warts at age 11 reported a 93% regression rate by age 16. Beyond adolescence, HPV infection becomes less well-characterized, with lesions frequently persisting into early adulthood, often extending into the mid-twenties - posing a significant cosmetic concern. [3][1] This review evaluates minimally invasive therapeutic strategies for facial HPV lesions that avoid permanent tissue alteration, with an emphasis on emerging immunomodulatory and targeted approaches.

Results

1. Therapeutic Categories

Several treatment options are available for facial warts caused by HPV and can be broadly grouped into the following categories:

Destructive therapies (e.g., cantharidin, salicylic acid, cryotherapy) are generally avoided in facial regions due to risks of scarring, prolonged ulceration, and low clearance rates.

Virucidal agents (e.g., cidofovir, interferon-α) target the virus directly but are not commonly used as first-line treatments.

Antimitotic therapies, which inhibit cell division, include bleomycin, podophyllotoxin, 5-fluorouracil, and both topical and systemic retinoids.

Immunomodulatory treatments (e.g., Candida antigen, contact allergen immunotherapy, imiquimod) aim to enhance the host immune response to infected cells.

Miscellaneous agents, such as trichloroacetic acid and polyphenon E, have shown limited but notable efficacy.

Combined therapies, such as phototherapy combined with pharmacological agents, are gaining traction.

Table 1 presents a summarized overview of the key treatment modalities for HPV-induced facial warts. It highlights mechanisms of action, approximate clearance rates, recurrence trends, and notable clinical considerations, all described further in the literature.

Table 1.

Treatment Modality	Mechanism	Clearance Rate (%)	Recurrence	Notes
Oral isotretinoin	Antimitotic (systemic)	~65	Low	Effective in multiple lesions
Topical retinoid + oral	Antimitotic (combined)	~68–70	Very Low	Faster response than oral isotretinoin alone
Nd:YAG laser	Selective photodestruction	~90	Very low	High efficacy, safe for facial use.
Intralesional bleomycin	Antimitotic injection	72.5–84	Very low	Best for recalcitrant warts
Topical 5-FU	Antimitotic (topical)	~54	Low	Effective alternative to retinoids
Imiquimod	Immune stimulation (topical)	27–89 (avg. 44)	Variable	Patient-dependent response
Candida antigen	Delayed-type hypersensitivity	~51 (facial)	Low	Good option for immunocompetent patients
HPV vaccine (9vHPV)	Adaptive immune boost	74.2 (reduction)	Low	Best response in younger patients

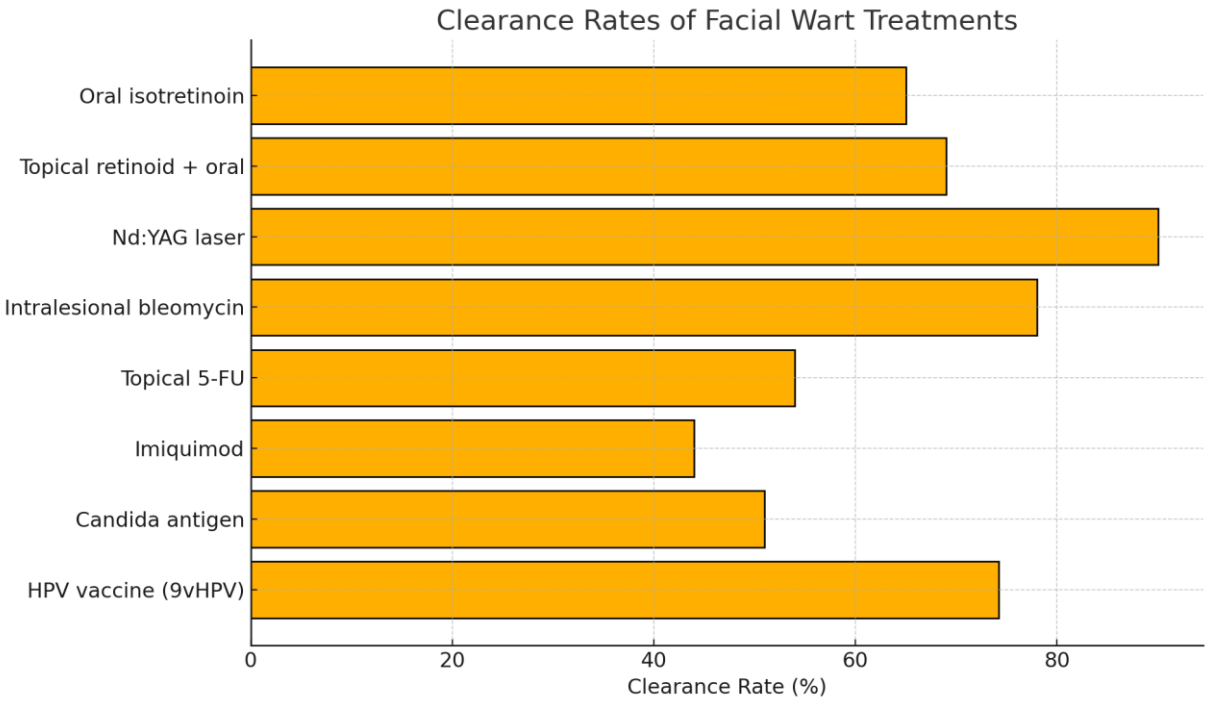

Fig. 1. *Clearance rates of various facial wart treatment options.*

1.1 Retinoids

Despite the variety of available therapies, facial warts, particularly in young adults, remain challenging to treat. Up to 30% of cases may become resistant to standard treatment protocols. Among available options, systemic and topical retinoids are considered first-line therapies by dermatologists especially in patients with multiple lesions in cosmetically sensitive areas. This approach offers high efficacy, sustainable price, favorable cosmetic outcomes, and relatively low recurrence rates. It requires although regular monitoring for systemic side effects such as mucocutaneous dryness, liver enzyme elevation, and teratogenicity, which can influence patient compliance and accessibility

Oral isotretinoin administered at 0.5 mg/kg/day for 12 weeks has shown promising results. Complete lesion clearance has been observed in approximately 65.13% of patients, with partial responses in about 19.26%.[5]

Topical isotretinoin 0.05% cream, applied nightly in combination with oral isotretinoin, has demonstrated superior response rates for plane warts compared to monotherapy. Although Gupta et al. reported no statistically significant difference between groups treated with oral isotretinoin alone versus in combination with topical therapy, combination treatment resulted in faster lesion resolution. Topical retinoids alone are generally not recommended as a standalone treatment due to high recurrence rates.[6]

1.2 Antimitotic Therapy

Intralesional Bleomycin glycopeptide antibiotic obtained from the Streptomyces verticillus (1–1.5 mg/mL) administered every 2–4 weeks for up to five sessions has shown high efficacy, particularly in smaller lesions, with clearance rates ranging from 72.5% to 84%. A meta-analysis of 927 patients and a recent prospective study confirmed its effectiveness, low recurrence rate (~2%), and acceptable side-effect profile.[13]

5-Fluorouracil (5-FU) is an antimetabolite that inhibits DNA and RNA synthesis. Topical 5-FU 5%, applied for four hours nightly and washed off after 8 weeks, led to a clearance rate of approximately 53.57%.[14]

1.3 Immunomodulatory Therapy

Imiquimod and candida antigen enhances the immune system's increasing delayed type hypersensitivity reaction to the wart tissue, even treating the distant warts. It stimulates Th1 cytokines that activate NK cells, macrophages, B and T-lymphocytes leading to wart resolution The results of these therapeutic options are strongly individual due to differ in people immune response and have wide range. [9]

Imiquimod (5% cream) stimulates a delayed-type hypersensitivity reaction by activating Th1 cytokines, which recruit NK cells, macrophages, and lymphocytes. Reported complete response rates vary widely—from 27% to 89%—with a combined efficacy of approximately 44%. Variability in dosing schedules and application frequency among studies underscores the need for more standardized protocols and larger, controlled trials.[7]

Candida antigen injections (0.1 to 0.5 mL of a 1:1000 solution) have shown promise. Higher doses (0.5 mL) resulted in clearance rates of 51% for common warts, compared to 27% for 0.3 mL. Although effective in treating non-common warts (e.g., flat, plantar, periungual, and facial lesions), the small sample sizes limit statistical significance. Personalized treatment regimens based on patient response are recommended, as optimal dosing and duration remain undetermined.[11]

1.4 Combined Therapy: Photodynamic Therapy (PDT)

Photodynamic therapy consists of three essential components: a photosensitizer (PS), a light source to activate the PS, and dissolved molecular oxygen in the tissue. Topical 5-aminolevulinic acid (ALA) is used in majority of cases as a photosensitizer. Recent trials using long-pulsed Nd:YAG laser (532 nm, 20 ms, 30 J/cm², 3 mm spot size) reported promising outcomes in treating facial plane warts. Three sessions spaced two weeks apart yielded an overall clearance rate of 86.36%, with complete resolution in 78.94% of cases. Recurrence was low (4.5%), and side effects were minimal. This therapeutic option generates highest costs from all onlisted [12]

1.5 Emerging Therapies

Over the past decade, studies have explored the immune-enhancing effects of localized hyperthermia, typically at tissue temperatures of 41–44°C. This non-lethal temperature range triggers the expression of heat shock proteins (HSPs), which in turn facilitate the maturation and migration of Langerhans cells and stimulate cytokine and interferon production. In a randomized controlled trial, 54% of patients receiving hyperthermia for plantar warts achieved resolution, compared to 12% in the placebo group. Another study demonstrated an 86% clearance rate in heated warts versus 41% in controls. [15]

Therapeutic HPV vaccination has also shown promise. A recent meta-analysis reported a 74.2% reduction in wart burden among patients treated with the quadrivalent HPV vaccine (4vHPV). The nonavalent vaccine (9vHPV) is gaining wider use globally. In a retrospective study on patients with recalcitrant warts persisting over one year and resistant to conventional therapy, age was significantly associated with treatment efficacy ($p < 0.05$), while gender, disease duration, lesion number, and wart subtype were not. Younger patients exhibited more favorable responses.[16]

Discussion

Facial warts in young adults present a unique clinical challenge due to their persistence, high recurrence potential, and visibility in cosmetically sensitive areas. Selecting the optimal therapy requires balancing efficacy, safety, cosmetic outcome, and patient-specific factors such as age, lesion burden, and prior treatment history. While destructive methods like cryotherapy remain common, their use on facial skin is limited by cosmetic risk. Systemic and topical retinoids are among the most accessible options and offer moderate-to-good efficacy, though adherence may be affected by side effects and the need for laboratory monitoring. Nd:YAG laser therapy stands out as the most effective single modality, achieving the highest clearance rate (~90%) and minimal recurrence, albeit at a higher cost. Intralesional bleomycin and immunotherapies such as imiquimod, Candida antigen, and HPV vaccination also demonstrate promising outcomes, especially in resistant cases. Combination approaches—such as topical agents with systemic therapy or immunotherapy with phototherapy—represent a logical direction for future protocols. Treatment should be individualized, and cost-effectiveness must be considered, particularly in younger populations who may experience spontaneous regression but also significant psychosocial burden.

Conclusions

Systemic and topical retinoids, phototherapy (Nd:YAG laser), immunomodulatory agents (imiquimod, Candida antigen, HPV vaccine), and intralesional bleomycin offer effective, minimally invasive treatment options. Among these, Nd:YAG laser demonstrates the highest efficacy (~90% clearance) with minimal recurrence and excellent cosmetic safety, though it may be cost-prohibitive in some settings. Oral isotretinoin offers a more accessible alternative but requires laboratory monitoring and patient compliance due to systemic effects. Combination therapies and novel immunological approaches such as the 9vHPV vaccine show strong potential. Comparative evaluation and treatment personalization based on patient age, lesion characteristics, cost accessibility, and previous treatment response are crucial. Further high-quality studies with standardized protocols are essential to optimize long-term outcomes and reduce recurrence.

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During preparing this work the authors have used ChatGPT for the purpose of improving language and readability. After using this tool, the authors have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

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