Alqalam Journal of Medical and Applied Sciences. 2026;9(4):1109-1114
https://doi.org/10.54361/ajmas.269445

Original article

A Comparative Clinical Study of Intralesional MMR Vaccine and Vitamin D3 in the Treatment of Cutaneous Warts

Hana Benjuma*

Internal Medicine Department, Faculty of Medicine, Elmergib University, Libya
Email. *hhbenjuma@elmergib.edu.ly*

Abstract
Cutaneous warts are frequent benign proliferations resulting from Human Papillomavirus (HPV). Conventional destructive therapies are often painful with frequent recurrences. Intralesional immunotherapy has emerged as an effective substitute by stimulating cell-mediated immunity. To compare the safety and effectiveness of the intralesional Measles, Mumps, and Rubella (MMR) vaccine versus intralesional vitamin D3 in the management of cutaneous warts in terms of response rate, speed of improvement, and complete clearance. This prospective randomized comparative research involved sixty cases with nongenital cutaneous warts, conducted from May 2024 to May 2025. Cases were randomly separated into two equal groups (number=30 each). Group A received the intralesional MMR vaccine (0.2 mL into the largest wart), and Group B received intralesional vitamin D3 (0.2 mL per wart after local anesthesia). Injections were repeated every two weeks for a maximum of 6 sessions. The response was assessed clinically as complete, partial, minimal, or no response. Insignificant variances have been observed among both groups regarding overall response rate or percentage of improvement ($p > 0.05$), with complete response achieved in 76.7% of the MMR group and 63.3% of the Vitamin 3 group. However, vitamin D3 required significantly fewer sessions (mean 3.01 ± 0.93) compared to MMR (mean 5.69 ± 0.62) ($p < 0.001$). Both treatments were well tolerated. Both intralesional vitamin D3 and the MMR vaccine are safe and efficient for cutaneous warts. Vitamin D3 offers the advantage of faster clearance with fewer treatment sessions.
Keywords. Cutaneous Warts, Intralesional MMR Vaccine, Intralesional Vitamin D3, Immunotherapy.

Introduction

Cutaneous warts are frequent benign epidermal proliferations resulting from infection with the human papillomavirus. They affect individuals of all age groups, with a higher prevalence among children, adolescents, and young adults. Although warts are generally self-limiting, spontaneous regression may take months to years, and many patients seek treatment due to pain, cosmetic concerns, social stigma, or functional impairment [1]. The management of cutaneous warts remains challenging. Conventional treatments, such as cryotherapy, electrocautery, laser ablation, and topical keratolytic agents like salicylic acid, primarily aim at physical destruction of the lesions. However, these methods are often associated with pain, risk of scarring, frequent recurrences, and variable efficacy [2].

In recent years, immunotherapy has emerged as a promising method in the management of cutaneous warts. This modality works via improving the host's immune response against HPV, leading to clearance of both distant and treated lesions. Intralesional immunotherapy, in particular, involves the injection of antigens or immunomodulatory agents directly into the wart, thereby stimulating a cell-mediated immune response [3]. The intralesional MMR vaccine has gained attention as a safe and effective immunotherapeutic choice for warts. It is thought to induce a delayed-type hypersensitivity reaction, enhancing the Th1 immune response and promoting the release of cytokines like interferon-gamma, interleukin-2, and tumor necrosis factor-alpha [4].

These cytokines play a key role in the activation of cytotoxic T cells and natural killer cells, which target and eliminate HPV-infected keratinocytes. Several studies have reported favorable outcomes with intralesional MMR, including high clearance rates and the resolution of distant untreated warts, with minimal side effects [5]. Our research aimed to compare the effectiveness and safety of the MMR vaccine against intralesional vitamin D3 in the management of cutaneous warts in terms of response rate, speed of improvement, and complete clearance.

Methods

This was a prospective, randomized, comparative clinical research done in the dermatology outpatient clinic conducted from May 2024 to May 2025. A total of 60 cases were randomly allocated into two equal groups utilizing a simple randomization method: Group A (MMR): Thirty cases received the intralesional MMR vaccine. Group B (Vitamin D3): 30 cases received intralesional Vitamin D3.

Inclusion criteria

Cases of either sex, aged twelve years and above, with clinically diagnosed single or multiple nongenital cutaneous warts (including verruca vulgaris, plantar warts, and periungual warts) that had persisted for at least three months.

Received*: 27-01-2026 -* ***Accepted****: 26-04-2026 -* ***Published****: 30-04-2026*

Exclusion criteria
Cases with genital, mucosal, or anogenital warts; immunocompromised patients (due to disease, medications, or systemic illness); pregnant or lactating women; cases with a history of hypersensitivity or allergic response to MMR vaccine or Vitamin D3; with acute febrile illness, active infection, or signs of hypervitaminosis D, and with keloidal tendency, history of asthma, convulsions, or severe organ dysfunction (e.g., renal or hepatic impairment).

Methods

All patients were subjected to the following:
Complete history taking
family history of warts, history of previous treatments for warts, duration of the current lesions, and number of warts.

Physical examinations
General examination and local dermatological examination: Detailed local examination of the warts was carried out, including documentation of the site, number, size, morphology, and type of warts (periungual, vulgaris, or plantar).

Investigational Studies: Routine laboratory investigations
These involved complete blood count (CBC), random blood sugar, hepatic function tests, renal function tests (serum urea and creatinine), and screening for HIV (to rule out immunocompromised status).

Treatment Protocol
The cases were categorized into groups. A study involved 30 cases that were administered the intralesional MMR immunization. Following dilution with 0.5 milliliters of distilled water, all cases had a direct injection of 0.2 mL of MMR into the largest wart utilizing an insulin syringe at two-week intervals, continuing until whole clearance or for a maximum of 6 management sessions. Group B comprised thirty cases who were administered intralesional vitamin D3. Initially, 0.2 milliliters was gradually injected into the base of each wart utilizing an insulin syringe. Each patient received treatment for a maximum of five warts in a single session. Within a single session, the maximum amount of vitamin D3 that could be injected was five milligrams. Injections have been carried out every two weeks until complete clearance or for a maximum of six treatment sessions. In both groups A & B, the surface area and quantity of warts have been recorded, and lesions have been photographed.

Response assessment
Complete response (CR) indicates total disappearance of warts and return of normal skin markings (100%); partial response (PR) signifies over fifty percent improvement; minimal response (MR) denotes under fifty percent improvement; and no response (NR) reflects stable illness (0%).

Follow up
The resolution of untreated remote warts has been documented. The enhancement percentage varied from 0% to 100% based on the size of the wart regression. Monthly monitoring was conducted for 6 months post-final session to identify any recurrence.

Statistical analysis
The gathered data was analyzed, encoded, and organized utilizing the SPSS program (Version 21) for Windows. Descriptive statistics comprised mean ± standard deviation for numerical information and frequency/percentage for categorical information. Analytical statistics utilized Student's t-test, chi-square test, and Mann-Whitney test when appropriate. Significance level: A P value above 0.05 reveals non-significance, a P value under 0.05 reveals statistical significance, and a P value under 0.001 is highly significant.

Results

Table 1 showed that there was no significant variance found among both groups regarding age or sex ($p > 0.05$), indicating comparable baseline demographic characteristics.

Table 1. Comparison of demographic data among the examined groups

Demographic data	Group A(MMR) Number=thirty	Group B (Vit D) Number = thirty	Test	P value
Age (years) Mean±SD	25.71 ± 9.89	24.64 ± 6.69	t = 0.4908	0.62
≤25	11 (36.7%)	17 (56.7%)		
>25	19 (63.3%)	13 (43.3%)	X^2=2.411	0.12
Sex				

Received*: 27-01-2026 -* ***Accepted****: 26-04-2026 -* ***Published****: 30-04-2026*

Male	17 (56.7%)	19 (63.3%)	X^2=0.278	0.59
Female	13 (43.3%)	11 (36.7%)		

SD: standard deviation, P > 0.05: Not significant, P < 0.05 is statistically significant, P < 0.001 is highly significant.

(Table 2) illustrates that there were insignificant variances observed between Group A (MMR) and Group B (Vitamin D) regarding family history, previous treatment, number, duration, or type of warts (all p > 0.05), indicating comparable baseline clinical characteristics.

Table 2. Comparison of clinical data between the examined groups

Clinical data	Group A(MMR) Number = thirty	Group B (Vit D) Number = thirty	Test	P value
Family history				
Positive	17 (56.7%)	19 (63.3%)	X^2=0.278	0.59
Negative	13 (43.3%)	11 (36.7%)		
Previous treatment				
No	11 (36.7%)	15 (50%)	X^2=1.086	0.29
yes	19 (63.3%)	15 (50%)		
Number of warts				
Single	7 (23.3%)	9 (30%)	X^2=0.341	0.55
Multiple	23 (76.7%)	21 (70%)		
Duration (months) Mean±SD Median (min-max)	 15.03 ± 14.62 12 (3-60)	 13.45 ± 15.78 6 (3-60)	U = 359.5	0.18
Type				
Periungual	7 (23.3%)	7 (23.3%)	X^2=0.348	0.84
Vulgaris	10 (33.3%)	12 (40%)		
Plantar	13 (43.3%)	11 (36.7%)		

Table 3 illustrates that there was no significant variance between Group A (MMR) and Group B (Vitamin D) regarding overall response or percentage of improvement (p > 0.05), with the majority of patients achieving a complete response in both groups.

Table 3. Comparison of response and percentage of improvement between the examined groups

Variables	Group A(MMR) Number = thirty	Group B (Vit D) Number = thirty	Test	P value
Response Mean±SD Median (min-max)	 87.72 ± 30.1 99 (0-100)	 75.76± 38.2 99(0-100)	U = 415.50	0.26
No response	3 (10%)	3 (10%)	X^2=1.981	0.57
Minimal response	3 (10%)	7 (23.3%)		
Partial response	1 (3.3%)	1 (3.3%)		
Complete response	23 (76.7%)	19 (63.3%)		

Table 4 showed that a highly significant variance has been found in the number of treatment sessions among the groups (p < 0.001). Group A (MMR) required more sessions (mean 5.69 ± 0.62) compared to Group B (Vitamin D) (mean 3.01 ± 0.93), with most patients in Group B achieving clearance in 2–3 sessions, whereas Group A needed 5–6 sessions.

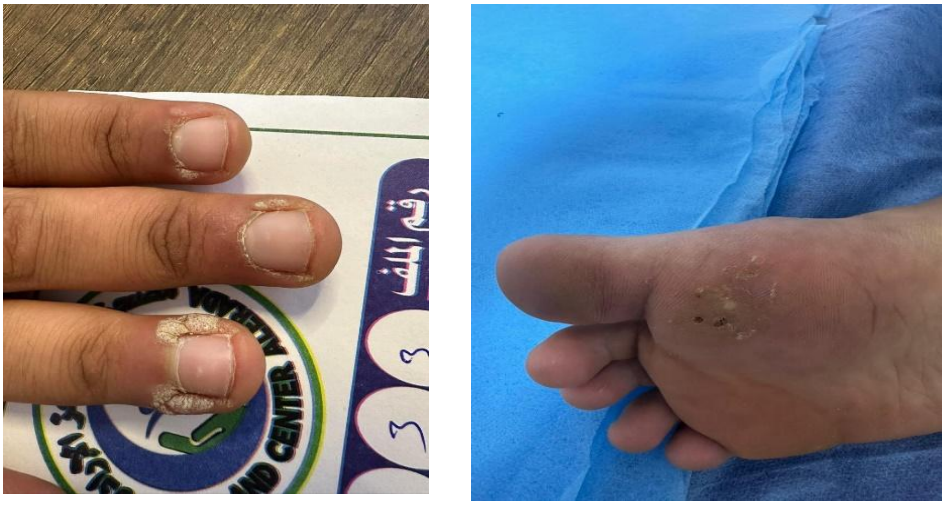
Table 4. Comparative analysis of the number of sessions between the examined groups

	Group A(MMR) Number = thirty	Group B (Vit D) Number = thirty	Test	P value
Number of sessions Mean±SD	5.69 ± 0.62	3.01 ± 0.93	t = 13.1329	<0.001*
2	0 (0%)	13 (43.3%)	X^2= 30.96	<0.001*
3	0 (0%)	5 (16.7%)		
4	3 (10%)	3 (10%)		
5	11 (36.6%)	0 (0.0%)		
6	16 (53.3%)	9 (30%)		

Received*: 27-01-2026 -* ***Accepted****: 26-04-2026 -* ***Published****: 30-04-2026*

Case presentation

Case 1 periungual wart before treatment ***Case 2 planter wart before treatment***



A

Complete response after Vit D, Complete response after MMR

B

Case 1. A: Before treatment, B: Complete response after 2 sessions, Vit D. Case 2. A: Before treatment, B: Complete response after 2 sessions MMR.

Discussion

This study showed that there were insignificant variances found among both groups regarding age or sex (p-value above 0.05), indicating comparable baseline demographic characteristics. In agreement with Kabra et al. [6], comparative clinical research aimed to assess the effectiveness of different intralesional immunotherapies, including the MMR vaccine and vitamin D3, in the management of cutaneous warts. Their study demonstrated that there was a statistically insignificant modification among the examined groups about age and sex (p-value above 0.05), indicating that the baseline demographic characteristics were comparable. Also, another randomized comparative study by Kabra et al. [6] aimed to assess the therapeutic effectiveness of the intralesional MMR vaccine, BCG vaccine, and vitamin D3 in the management of cutaneous warts. Their study reported that there were statistically insignificant variances among the groups with regard to age and sex distribution ($p > 0.05$). Also, Balach et al. [7] conducted a recent systematic review and meta-analysis to assess the effectiveness of various intralesional immunotherapies, including vitamin D3 and the MMR vaccine, for the management of cutaneous warts. Their study found that there were insignificant variances in baseline demographic characteristics between the treatment groups in the included trials, supporting the assumption of comparability.

The present study found that there were insignificant variances observed among Group A (MMR) and Group B (Vitamin D) with regard to family history, previous treatment, number, duration, or type of warts (all $p > 0.05$), indicating comparable baseline clinical characteristics. In accordance with Baaniya et al. [8], comparative prospective research was conducted to evaluate the effectiveness of the intralesional MMR vaccine against intralesional vitamin D_3 in the management of nongenital cutaneous warts. Their study reported that there were statistically insignificant variances among the examined groups in baseline

Received*: 27-01-2026 -* ***Accepted****: 26-04-2026 -* ***Published****: 30-04-2026*

characteristics, supporting that both groups were clinically comparable before treatment. Also, Sallam et al. [9], a recent comparative clinical study, aimed to assess the safety and effectiveness of the intralesional MMR vaccine against intralesional vitamin D3 in the management of cutaneous warts. Their study reported that there were statistically insignificant variances among the groups regarding duration of warts (p = 0.070), previous treatment (p = 0.177), size of lesions (p = 0.740), or type of warts (p = 0.817). Also, Al-Sabak et al. [10] conducted clinical therapeutic research to evaluate the effectiveness of intralesional vitamin D3 in the management of cutaneous warts. Their study demonstrated that proper assessment of clinical variables such as wart type and duration is essential to ensure comparability and validity of results across treatment groups.

This study revealed that there was insignificant variance among Group A (MMR) and Group B (Vitamin D) regarding overall response or percentage of improvement (p-va0.05), with the majority of patients achieving complete response in both groups. In the same line as Shaldoum et al. [11], a comparative clinical study was conducted to assess the effectiveness of intralesional MMR vaccine against intralesional vit D3 in the treatment of cutaneous warts. Their research demonstrated that a complete response was achieved in eighty percent of cases in the MMR group and 66.7% in the vitamin D3 group, with a statistically insignificant variance between the two groups (p-value above 0.05). Also, Singh et al. [12], a randomized single-blind controlled trial, aimed to compare the safety and effectiveness of the intralesional MMR vaccine and intralesional vitamin D in the management of common warts. Their research showed that although both groups showed significant improvement, there was a statistically insignificant variance among MMR and vitamin D groups regarding overall response or complete clearance rates (p > 0.05).

Our findings demonstrated that a highly significant variance in the number of treatment sessions among the groups (p-value under 0.001). Group A (MMR) required more sessions (mean 5.69 ± 0.62) compared to Group B (Vitamin D) (mean 3.01 ± 0.93), with most patients in Group B achieving clearance in 2–3 sessions, whereas Group A needed 5–6 sessions. In accordance with Sallam et al. [9], a randomized clinical trial was done to assess the safety and effectiveness of the intralesional MMR vaccine against intralesional vitamin D3 in the treatment of cutaneous warts. Their research showed that both groups required multiple treatment sessions, with injections administered every two weeks for up to five sessions, and the number of sessions required varied among patients depending on response. Also, Shaldoum et al. [11], a randomized single-blind controlled trial aimed to compare intralesional vitamin D and intralesional MMR vaccine in the management of frequent warts. Their research showed that patients received injections every three weeks for a maximum of three sessions or until whole clearance, indicating variability in the number of sessions required among patients and between treatment modalities.

Limitations

However, it is important to acknowledge several limitations of our study. The sample size was relatively small (n=60), and certain wart subtypes had particularly limited representation: periungual warts (n=14). Additionally, did not assess viral types. Future studies with larger, more balanced sample sizes across all wart subtypes would be necessary to validate these preliminary findings.

Conclusion

This study concluded that both intralesional vitamin D3 and the intralesional MMR vaccine were found to be safe and efficient treatment modalities for cutaneous warts, with insignificant variance between the two groups with regard to overall response rate or percentage of improvement. However, intralesional vitamin D3 demonstrated a significant advantage by achieving wart clearance with fewer treatment sessions compared to the MMR vaccine. Therefore, while both therapies are viable options, vitamin D3 may be considered a more convenient and time-efficient treatment alternative for patients with cutaneous warts.

Conflict of interest. Nil

References

1. Shimizu A, Yamaguchi R, Kuriyama Y. Recent advances in cutaneous HPV infection. J Dermatol. 2023;50(3):290–8.
2. Kore VB, Anjankar A. A comprehensive review of treatment approaches for cutaneous and genital warts. Cureus. 2023;15(10).
3. Mohammed GF, Al-Dhubaibi MS, Bahaj SS, Elneam AIA. Systemic immunotherapy for the treatment of warts: a literature review. J Cosmet Dermatol. 2022;21(11):5532–6.
4. Kucharczyk E, Pawłuszkiewicz K, Biliński K, Maj J, Ponikowska M. Intralesional immunotherapy for non-genital viral warts: a review of current evidence and future perspectives. Int J Mol Sci. 2025;26(12):5644.
5. Aghbash PS, Rasizadeh R, Nahand JS, Baghi HB. The role of immune cells and inflammasomes in modulating cytokine responses in HPV-related cervical cancer. Int Immunopharmacol. 2025;145:113625.
6. Kabra N, Sinha R, Pallavi UK. A comparative study of the therapeutic efficacy of various intralesional immunotherapies in extragenital cutaneous warts. 2026.

Received*: 27-01-2026 -* ***Accepted****: 26-04-2026 -* ***Published****: 30-04-2026*

7. Balach R, Khalid A, Rasool A, Kashif A, Ahmad A, Zafar A, et al. Comparative efficacy and safety of intralesional MMR vaccine and vitamin D3 in managing nongenital warts: a systematic review and meta-analysis. J Cosmet Dermatol. 2026;25(1):e70618.
8. Baaniya B, Marahatta S, Dahal R, Shah N. A comparative prospective study to assess efficacy of intralesional MMR (measles, mumps, rubella) vaccine and intralesional vitamin D3 in treatment of nongenital warts. Health Sci Rep. 2025;8(5):e70782.
9. Sallam M, Awad A, Hamdy S, State A. Intralesional measles, mumps, and rubella vaccine versus vitamin D for treatment of warts: a randomised clinical trial. Indian J Dermatol Venereol Leprol. 2026;92(2):286.
10. Al-Sabak H, Al-Hattab M, Al-Rammahi M, Al-Dhalimi M. The efficacy of intralesional vitamin D3 injection in the treatment of cutaneous warts: a clinical therapeutic trial study. Skin Res Technol. 2023;29(8):e13442.
11. Shaldoum DR, Hassan GFR, El Maadawy EH, El-Maghraby GM. Comparative clinical study of the efficacy of intralesional MMR vaccine vs intralesional vitamin D injection in treatment of warts. J Cosmet Dermatol. 2020;19(8):2033–40.
12. Singh S, Pal S, De A. A randomised single-blind controlled trial comparing efficacy of intralesional vitamin D injection and MMR (measles, mumps, rubella) vaccine in treatment of warts. Indian J Dermatol. 2025;70(3):169.

Received*: 27-01-2026 -* ***Accepted****: 26-04-2026 -* ***Published****: 30-04-2026*