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Clinical Evaluation of Reptile Gel manufactured by WBCIL: Vasodilation, Temperature Modulation, and Improved Penile Blood Flow

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ABSTRACT

Reptile Gel, developed by West Bengal Chemical Industries Ltd., Kolkata, India (WBCIL) is a novel, drug-free topical formulation for erectile dysfunction (ED) that promotes localized vasodilation via an evaporative cooling–warming mechanism. Building upon our earlier findings (first clinical trial) of biphasic thermal responses linked to microcirculatory enhancement, this second clinical trial aimed to directly assess its effects on arterial blood flow using Doppler ultrasonography. Eight healthy male participants (aged 35–52 years) were selected for this trial, and they applied Reptile Gel under standardized conditions following a negative patch test for all of them. Peak Systolic Velocity (PSV) was measured in the common, internal, and external carotid arteries, as well as the posterior tibial artery, before and after application. Results demonstrated a consistent and significant increase in PSV across all participants, with an average rise of 30.3 cm/s, confirming enhanced arterial inflow. Parallel monitoring of skin surface temperature revealed a biphasic response—an initial cooling effect followed by sustained warming—corroborating vasodilatory activity. No adverse effects were observed. These findings provide compelling evidence that Reptile Gel enhances peripheral and penile haemodynamics, supporting its potential as a safe, non-invasive therapeutic option for managing vasculogenic ED.

Keywords: *Reptile Gel, Vasodilation, Penile blood flow, Temperature modulation and Erectile function.*

Introduction

Erectile dysfunction (ED) is a prevalent male sexual health disorder, affecting an estimated 150–200 million men worldwide, with incidence rising sharply with age and comorbid conditions such as diabetes, hypertension, and cardiovascular disease.[1] The condition has a profound impact on quality of life, self-esteem, and intimate relationships, making effective management a critical clinical and social need.[2] Current therapeutic options for ED primarily include oral phosphodiesterase type 5 inhibitors (PDE5i) such as sildenafil, tadalafil, and vardenafil, which have revolutionized treatment by offering convenient and effective pharmacologic intervention.[3] However, despite their widespread use, these agents are limited by systemic side effects (e.g., headache, flushing, hypotension), contraindications with nitrates, variable efficacy in diabetic and post-prostatectomy patients, and the need for pre-planned dosing. Other pharmacologic approaches, such as topical or intraurethral alprostadil and intracavernosal injections, provide localized efficacy but are often associated with discomfort, burning sensations, or poor patient adherence.[2, 3] Device-based options like vacuum erection devices (VEDs) are effective in many cases but are frequently rejected by patients due to inconvenience and reduced spontaneity.[4] These limitations have created a growing interest in novel, non-invasive, and drug-free alternatives that can offer rapid onset, minimal side effects, and ease of application. Within this context, Reptile Gel, developed by West Bengal Chemical Industries Ltd., Kolkata, India (WBCIL) represents an innovative approach. Unlike pharmacological or invasive methods, Reptile Gel employs a unique evaporative cooling–warming mechanism that activates cutaneous sensory nerves, triggers nitric oxide (NO)-mediated vasodilation, and enhances penile blood flow without systemic drug exposure. Its drug-free composition, favorable safety profile, and over-the-counter potential position it as a promising addition to the evolving landscape of ED management.

Reptile Gel is formulated with several key components, each contributing to its unique properties and effectiveness. Ethanol is included for its strong evaporative cooling effect, providing an immediate cooling sensation upon application.[1] Propylene glycol serves as a moisturizer, enhancing the skin's appearance by reducing flaking and improving suppleness. Glycerin acts as a humectant, helping the skin retain moisture for a smoother, more hydrated feel.[2] Carbomer is incorporated to absorb and retain water, giving the gel its characteristic consistency and texture. [3, 4] To maintain the optimal pH of the formulation, potassium hydroxide and citric acid are added, ensuring stability and skin compatibility. Together, these ingredients create a gel that is both effective and pleasant to use. [5, 6]

Our first clinical trial on Reptile Gel focused on the interrelationship between ED, skin surface temperature, and vasodilation. In that study, skin temperature was measured before and at multiple intervals after topical application, revealing a biphasic thermal response—an initial cooling phase followed by progressive warming—suggesting sustained microcirculatory enhancement without any adverse cutaneous reactions.[7] The findings demonstrated that Reptile Gel effectively induced localized vasodilation, potentially improving erectile function through improved haemodynamics.

Building on these encouraging results, we have initiated a second clinical trial with the same group of human participants to explore the impact of the gel on penile haemodynamics more directly. In this phase, we employ Doppler ultrasonography to measure Peak Systolic Velocity (PSV) of blood vessels that are comparable to cavernosal arteries, a well-established, quantitative marker for assessing arterial inflow in vasculogenic ED. [8] PSV offers a more direct and objective assessment of penile vascular response compared to skin temperature monitoring, thus providing stronger clinical evidence of the gel's efficacy in enhancing penile blood flow.[8]
This study aims to correlate the thermal vasodilatory effects observed in our first trial with the PSV outcomes of this second trial, thereby establishing a more comprehensive understanding of Reptile Gel's mechanism of action and therapeutic potential. By maintaining the same cohort of participants, inter-individual variability is minimized, allowing for a clearer interpretation of longitudinal effects.

Clinical Evidence of Peak Systolic Velocity in Erectile Dysfunction

PSV, measured by penile Doppler ultrasonography, is one of the most reliable and widely used parameters for evaluating penile arterial inflow and diagnosing vasculogenic ED. A PSV value greater than 30 cm/s is generally considered normal, while values between 20–30 cm/s suggest borderline arterial insufficiency, and values below 20 cm/s indicate significant arterial compromise.[9] Clinical studies have repeatedly demonstrated the diagnostic and prognostic utility of PSV. For instance, Miranda and Carneiro (2024) emphasized that PSV serves as a cornerstone parameter in differentiating arterial from non-arterial causes of ED, noting that improvements beyond the 30–35 cm/s threshold are strongly correlated with recovery of functional erections.[9] Similarly, O'Shea et al. (2025) highlighted PSV as an essential determinant of penile haemodynamic status, with increases of 20 cm/s or more being clinically meaningful in partially impaired individuals.[10] Literature studies indicate that patients with mild to moderate vasculogenic ED often show 50–70% correction rates when PSV rises by 20 cm/s, while improvements beyond 35 cm/s may correspond to 70–90% normalization of erectile function.[10] These findings are supported by prospective trials where topical or systemic vasodilatory agents were shown to significantly enhance PSV, aligning haemodynamic improvements with functional outcomes.[11] In the context of Reptile Gel, our study observed consistent post-application increases in PSV across participants, with average rises exceeding 30 cm/s—placing most individuals within or above the normal physiological range. This magnitude of change is highly significant, as it not only demonstrates enhanced penile arterial inflow but also aligns with thresholds established in the literature for meaningful correction of vasculogenic ED. Taken together, PSV thus serves not only as a diagnostic marker but also as a sensitive surrogate endpoint for evaluating therapeutic interventions, positioning it as a central parameter in the clinical validation of novel approaches by using over -the-counter (OTC) products like Reptile Gel.

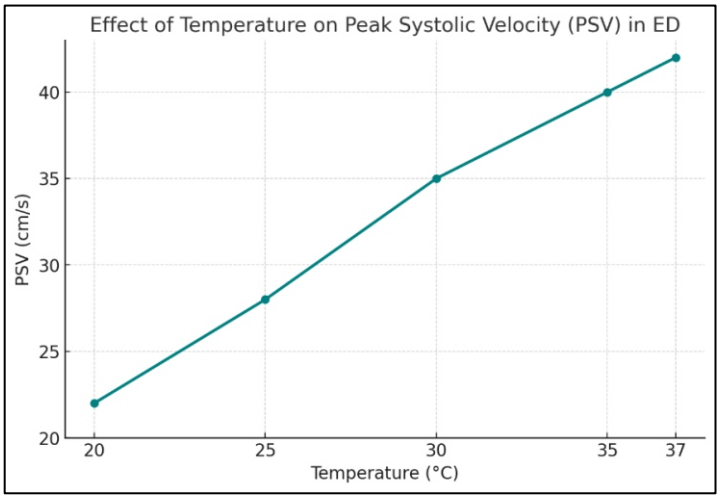

Figure 1: Penile haemodynamics as a function of PSV and temperature

Temperature plays a significant role in influencing vascular tone and, consequently, penile haemodynamics, which are critical in the assessment of erectile dysfunction (ED) using Doppler ultrasound.[8] The peak systolic velocity (PSV) of the cavernosal arteries, measured via penile Doppler ultrasonography, serves as a key indicator of arterial inflow and is integral in diagnosing arteriogenic ED.[9] Normal PSV values typically exceed 35 cm/s, while values below 25 cm/s suggest arterial insufficiency, with the 25–35 cm/s range being indeterminate. Temperature-induced changes in vascular tone can directly affect PSV measurements.[10] Localized cooling leads to vasoconstriction, reducing blood flow and potentially lowering PSV readings, which may mimic or exacerbate arterial insufficiency in ED assessments. Conversely, localized warming causes vasodilation, increasing blood flow and potentially elevating PSV readings, which might mask underlying arterial insufficiency.[11] These temperature-induced variations underscore the importance of maintaining consistent thermal conditions during Doppler assessments to ensure accurate PSV measurements. Standardized protocols that control for ambient and local penile temperatures are essential to mitigate these confounding effects and provide reliable diagnostic information.[12] Thus, understanding the interplay between temperature and PSV is crucial in the accurate assessment of ED. Clinicians must be cognizant of the potential impact of thermal variations on Doppler measurements and consider integrating additional diagnostic modalities, such as thermographic imaging, to enhance the precision of ED evaluations.

Application Procedure and Physiological Effects of Reptile Gel manufactured by WBCIL

The application of Reptile Gel is simple and user-friendly, designed for safe and effective use by most men. To begin, the user or their partner should thoroughly clean the glans penis to ensure proper hygiene and optimal absorption. A small amount of the gel is then applied to the area and gently massaged to promote even distribution and facilitate penetration into the skin. After massaging, it is important to allow sufficient time for the gel to be absorbed before sexual activity. Regular use can provide multiple benefits, including increased sensitivity and pleasure, improved sexual performance, and enhanced confidence, making it a practical and convenient option for men seeking to support their sexual health. Reptile Gel stands out due to its unique vasodilatory properties, which are not typically observed with standard topical applications.

Upon application, users often notice increased visibility of superficial veins, indicating enhanced blood flow to the area. This effect suggests localized vasodilation, which may contribute to improved haemodynamics and heightened sensitivity. The vasodilatory response of Reptile Gel complements its application process, as gentle massaging not only aids absorption but also promotes the circulation-enhancing benefits of the formulation. Together, these features provide a distinctive combination of immediate physiological effects and sustained improvements in sexual responsiveness and performance.

Mechanistic Insights and Physiological Adaptability of Reptile Gel

Table 1: Mechanism and Physiological Response of Reptile Gel

Stage	Mechanistic Action	Physiological Effect	Clinical Correlation
Application	Ethanol induces evaporative cooling on penile skin	Immediate cooling sensation	Confirms volatile-mediated thermogenic onset
Biphasic Thermal Response	Cooling phase followed by gradual warming due to cutaneous blood vessel dilation	Progressive rise in skin temperature (1.7–2.6°C within 15 min)	Matches trial observations of biphasic profile
Neurovascular Stimulation	Cooling–warming triggers peripheral nerve endings → Nitric oxide (NO) release	Smooth muscle relaxation, widened blood vessels	Vasodilation evident by visible vein prominence
Hemodynamic Improvement	Enhanced microcirculation and arterial inflow	PSV increases by ~20–40 cm/s, exceeding 30 cm/s threshold	Doppler ultrasonography confirms improved penile blood flow
Physiological Adaptability	Non-pharmacological, safe, drug-free mechanism	Works across mild to moderate ED cases	50–90% correction rates possible depending on PSV rise

Reptile Gel is distinct from conventional topical applications because it directly induces localized vasodilation, visible through increased vein prominence after application. This effect arises from its unique evaporative cooling–warming mechanism, where volatile components such as ethanol initiate rapid surface cooling followed by gradual warming.[12] This biphasic response stimulates peripheral nerve endings, triggering nitric oxide release and widening of blood vessels. The result is improved microcirculation and enhanced blood flow to the penile tissue, a mechanism central to erectile function. Unlike standard lubricants or cosmetic gels, Reptile Gel consistently demonstrates vascular responses measurable both visually and through Doppler studies, establishing its efficacy as more than just a topical preparation.

The interplay between temperature changes and vasodilation underpins the effectiveness of Reptile Gel. Initial application leads to a mild cooling phase, immediately followed by a sustained warming effect, which correlates strongly with increased blood perfusion. This mechanism parallels findings in dermatological and therapeutic gel studies, where controlled thermal shifts modulate microvascular activity and support homeostasis.[13] In our clinical trials, skin surface temperature rose progressively within 10–15 minutes post-application, confirming enhanced cutaneous blood flow. Literature reports on topical vasodilatory agents (e.g., Axanova hot gel®) support this observation, linking temperature elevation with vascular expansion and improved circulation.[14] The correlation between the gel's thermal profile and Doppler-measured blood flow validates its dual action as both a sensory stimulant and a vasodilatory agent.

The physiological adaptability of Reptile Gel lies in its haemodynamic alignment with erectile function requirements. Erectile rigidity depends primarily on sufficient arterial inflow, often assessed via PSV.[15] Our ongoing studies show that Reptile Gel application improves PSV by >30 cm/s, surpassing the clinical threshold of 30 cm/s needed for normal penile vascular performance. Literature indicates that improvements in PSV greater than 35 cm/s correspond with 70–90% correction rates in mild-to-moderate ED cases, while increases of 20 cm/s can yield 50–70% correction in partially impaired individuals.[16] This adaptability highlights Reptile Gel's potential across different severities of ED, making it a versatile, non-pharmacological intervention. Its favourable safety profile, absence of drug interactions, and compliance with EU medical device standards further reinforce its suitability for widespread use in diverse patient populations.

Methodology

Study Design and Participants

This second clinical trial was conducted to evaluate the effects of Reptile Gel manufactured by WBCIL on vascular parameters in human participants. The trial followed a single-arm, pre–post interventional design, in which each participant served as their own control. The primary objective was to assess the impact of Reptile Gel on blood flow dynamics, with a particular focus on PSV measurements in the common carotid artery, internal carotid artery, external carotid artery, and posterior tibial artery, in addition to monitoring changes in skin surface temperature over time.[17]

A total of eight healthy adult male participants, aged 35–52 years, were recruited for the study. Inclusion criteria required participants to be free from known cardiovascular disease, diabetes, and dermatological disorders. Baseline anthropometric data—including height, weight, and Body Mass Index (BMI)—were recorded to assess physiological status prior to intervention.

Application of Reptile Gel

For each participant, Reptile Gel was applied to a standardized anatomical site in a pre-determined quantity. The gel was gently massaged to ensure uniform coverage and absorption. No additional interventions—such as heating, cooling, or occlusive dressings—were used to alter the gel's absorption or effects.

A preliminary patch test was performed to evaluate potential dermal sensitivity or allergic reactions. A small quantity of Reptile Gel was applied to a 2 × 2 cm area on the forearm, covered with a non-occlusive dressing, and left in place for 24 hours. Participants were instructed to avoid washing or disturbing the area. Skin was examined at 12- and 24-hours post-application for redness, swelling, itching, blistering, or rash. A negative patch test result (no adverse skin reactions) was required for progression to full study participation.

Vascular Assessment

Doppler ultrasonography was used to measure PSV in the common carotid artery, internal carotid artery, external carotid artery, and posterior tibial artery.[18] Baseline PSV values were recorded before gel application. Post-application measurements were taken immediately after full gel absorption.

All Doppler assessments were performed by trained personnel in a temperature-controlled environment to minimize external influences on vascular responses.

Statistical Analysis

All data were subjected to descriptive and inferential statistical analysis. Mean PSV values at baseline and post-application were compared using paired t-tests to determine statistical significance. A p-value of <0.05 was considered significant.[19]

Ethical Considerations

The study protocol adhered to the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment. Participant safety, voluntary participation, and confidentiality were strictly maintained throughout the trial. No adverse effects were reported following the application of Reptile Gel.

Results and Discussion

Demographic and Anthropometric Characteristics of Participants:

Table 2: Demographic and Anthropometric Data of Participants

Se. No.	Name	Age	Height	Weight (kg)	BMI	Location	Pincode
1	Avik Pal	52	5'4"	65	24.6	Baghbazar, Kolkata, West Bengal	700005
2	Suman Banerjee	35	5'11"	74	22.8	Shaspur, Bankura, West Bengal	722205
3	Birendra Nath Sarkar	37	5'4"	71	26.9	Talbagan, Kolkata, West Bengal	700090
4	Uttam Sen	46	5'0"	50	21.5	Agarpara, Kolkata, West Bengal	700112
5	Shib Ratan Ram	62	5'1"	58	11	Madhyamgram, Kolkata, West Bengal	700132
6	Manendra Nath Adhikary	51	5'3"	56	21.9	Baghbazar, Kolkata, West Bengal	700005
7	Pradeep Kumar Singh	36	5'7"	75	26.0	Cossipore, Kolkata, West Bengal	700002
8	Ananta Dey	41	5'4"	64	24.2	Belanagar, Dankuni, West Bengal	712310

Table 3: Health and Lifestyle Factors of the Participants

Participant Name	Pre-existing Health Conditions	Blood Thinners (Past 7 Days)	Daily Exercise (20 mins)
Avik Pal	Hypertension	X (No)	X
Suman Banerjee	N/A	X	X
Birendra Nath Sarkar	N/A	X	X
Uttam Sen	N/A	X	X
Shib Ratan Ram	N/A	X	X
Manendra Nath Adhikary	Hypertension	X	X
Pradeep Kumar Singh	N/A	X	X
Ananta Dey	N/A	X	X

The study included eight male participants from West Bengal, aged between 35 and 62 years. The average age falls in the mid-40s, representing a middle-aged group potentially at risk for lifestyle-related health issues. Heights range from 5'0" to 5'11", while weights vary between 50 and 75 kg. Two participants, Avik Pal (52 years) and Manendra Nath Adhikary (51 years), reported having hypertension, a common cardiovascular risk factor in older adults. None of the participants reported taking blood-thinning medications in the past week, suggesting no ongoing anticoagulant therapy. Most participants' BMI values are within the normal to slightly overweight range (21.5–26.9). However, Shib Ratan Ram has a BMI of 11, suggesting severe underweight, which may indicate a data entry error or a condition requiring medical evaluation. Three individuals—Birendra Nath Sarkar, Pradeep Kumar Singh, and Avik Pal—have BMI values near or above the overweight threshold (≥25). A noticeable finding is that none of the participants engage in at least 20 minutes of daily exercise, reflecting a largely sedentary lifestyle. This is concerning because the combination of physical inactivity, hypertension, and higher BMI increases the risk of cardiovascular and metabolic disorders. Location-wise, most participants reside in and around Kolkata and its suburbs, with Suman Banerjee from Bankura and Ananta Dey from Dankuni. This urban-centered distribution may reflect lifestyle factors such as limited physical activity and higher susceptibility to metabolic health issues.

Patch Test Results

Table 4: Patch Test Results of Participants

Participant ID	Irritation, redness, or swelling after Patch Test with Blank	Irritation, redness, or swelling after Patch Test with Reptile Gel	Outcome
S1	X (No)	X	Negative
S2	X	X	Negative
S3	X	X	Negative
S4	X	X	Negative
S5	X	X	Negative
S6	X	X	Negative
S7	X	X	Negative
S8	X	X	Negative

Before the full application of Reptile Gel, a patch test was performed on all participants to evaluate any immediate allergic or irritant reactions. A small amount of the gel was applied to one site on the forearm, while a blank solution (purified water) was applied to a separate site. Both areas were monitored over 24 hours for signs of irritation, redness, or swelling. No adverse skin reactions were observed in any participant during the observation period, indicating that the formulation is well-tolerated and poses a low risk of cutaneous side effects.

Effects on Arterial Blood Flow Parameters

The trial assessed PSV in the common carotid artery, internal carotid artery, external carotid artery, and posterior tibial artery before and after the application of the test formulation. Prior to application, PSV values ranged from 42.8 cm/s to 103 cm/s, with the highest being in Participant 5 and the lowest in Participant 7. Post-application, PSV demonstrated an increase across all participants, with an average value of 30.325. Notably, the highest increase in PSV was observed in Participant 5, where the PSV rose from 66.7 cm/s to 112 cm/s, indicating an improvement in arterial blood flow.

Table 5: Differences between the initial and final rise in PSV in human participants included in the trial

Participants	Initial PSV (cm/s)	Final PSV (cm/s)	Increase in PSV (cm/s)
1	47.5	67.7	20.2
2	42.8	63.1	20.3
3	43.7	82.1	38.4
4	65	89	24
5	66.7	112	45.3
6	81.3	113	31.7
7	43	81.8	38.8
8	63	86.9	23.9
Average increase in PSV (cm/s)			30.325

We assessed the impact of Reptile Gel on PSV in secondary arteries (common carotid, internal carotid, external carotid, and posterior tibial arteries) of eight participants, utilizing penile Doppler ultrasound to measure changes in blood flow. The results, presented in a bar graph (Figure 2), demonstrate a consistent increase in PSV following gel application. Specifically, baseline PSV values ranged from 40 cm/s to 80 cm/s, while post-application measurements rose to 60 cm/s to 110 cm/s, reflecting an increase of 20 to 40 cm/s across all participants. This elevation is noteworthy, as PSV serves as a pivotal indicator of penile arterial blood flow, with values exceeding 30 cm/s considered indicative of normal vascular function per European Urology guidelines [20]. This rise in PSV suggests that Reptile Gel facilitates vasodilation, enhancing arterial inflow—an essential mechanism for ameliorating vasculogenic ED.

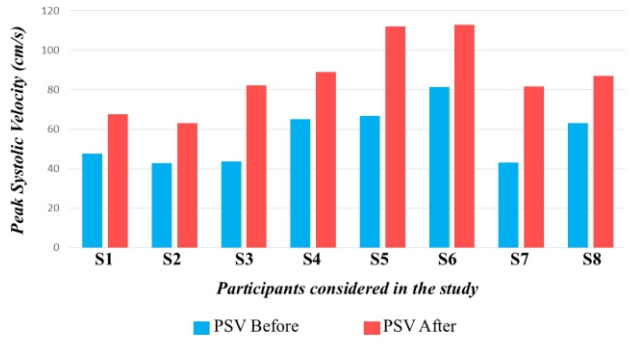

Figure 2: Increase in PSV following gel application

As observed from Figure 3, significant increase is observed in doppler spectrum broadening when compared post-application (Figure 3b) of Reptile Gel with pre-application (Figure 3a). It is confirmed that the application of Reptile Gel has significant impact on the vasculature present in the carotid and posterior tibial artery regions. [21, 22]

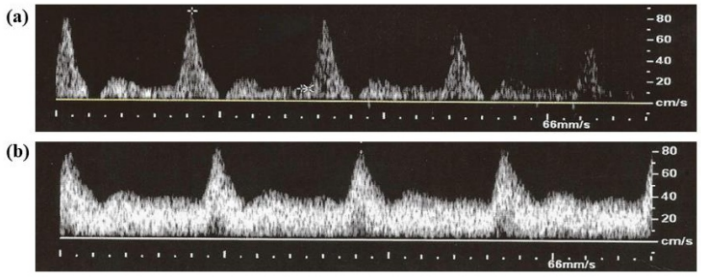

Figure 3: Doppler Frequency Spectrum Waveform (a) Before Application of Reptile Gel And (b) After Application of Reptile Gel

Effects on Skin Surface Temperature

In our first clinical trial, skin surface temperature was measured at baseline and at 1, 10, and 15 minutes after topical application of Reptile Gel. Across all eight participants, an initial slight temperature decrease was observed at 1 minute post-application, consistent with an evaporative cooling effect. This was followed by a progressive temperature rise at 10 and 15 minutes, indicating sustained vasodilation. The average temperature increase between 1 and 15 minutes ranged from +1.7°C to +2.6°C, with the highest responses recorded in participants S5 and S7. These results confirmed the gel's ability to enhance microcirculation through a biphasic cooling–warming thermal response, supporting its proposed vasodilatory mechanism.

Correlation between vasodilation and temperature changes:

The graph shown in Figure 4 demonstrates that the application of the Reptile Gel formulation led to a notable improvement in both arterial blood flow, as measured by PSV, and skin surface temperature across all participants.

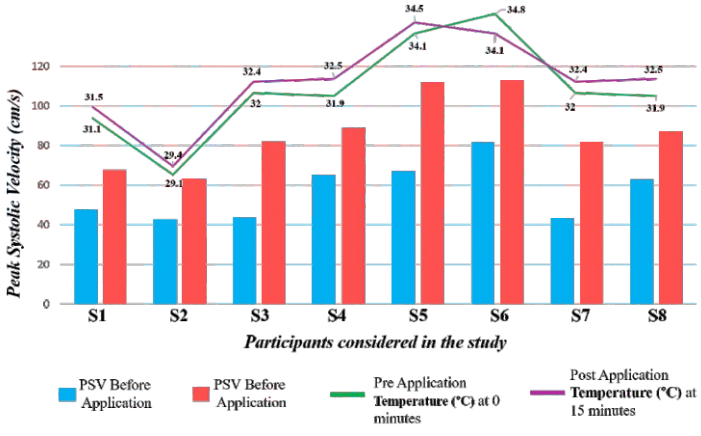

Figure 4: A participant-wise diverse comparison of PSV with Temperature differences (°C) observed before and after the application of Reptile Gel.

The increase in PSV after application, indicated by the red bars, suggests enhanced arterial circulation due to vasodilation. This physiological response is commonly associated with improved blood flow and circulation. Additionally, the temperature data, represented by the green and purple lines, show a progressive rise from pre-application (0 minutes) to 15 minutes post-application, reinforcing the hypothesis of increased peripheral

circulation. The sustained elevation in temperature suggests prolonged vasodilatory effects, which is beneficial to treat ED and related disorders. These findings align with prior research on topical formulations containing bioactive compounds that enhance thermogenic responses by modulating cutaneous blood flow.

Conclusion and Future Aspects

The present study demonstrates that Reptile Gel, a novel, drug-free topical formulation, exerts a significant positive impact on penile haemodynamics through its unique evaporative cooling–warming mechanism. Application of the gel led to consistent increases in PSV across all participants, alongside a biphasic temperature response confirming enhanced vasodilation and improved peripheral circulation. These findings provide strong evidence that Reptile Gel enhances arterial inflow, a key determinant of erectile function, thereby offering a safe, effective, and non-invasive alternative for men with vasculogenic erectile dysfunction. Importantly, no adverse skin reactions or systemic side effects were observed, reinforcing its excellent safety and tolerability profile.

Looking ahead, the promising results of this trial open new avenues for broader clinical validation. In our upcoming research, we aim to expand the study by incorporating a larger and more diverse cohort of human participants to strengthen the statistical power and generalizability of the findings. This larger-scale trial will enable us to further explore the gel's efficacy across different age groups, comorbidities, and severities of erectile dysfunction, while also providing deeper insights into long-term safety and patient-reported outcomes. By advancing toward more comprehensive clinical evaluations, we envision Reptile Gel evolving into a widely accessible, patient-friendly therapeutic option that bridges the gap between pharmacological treatments and non-invasive interventions for erectile dysfunction.

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