International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effect of Matrix Rhythm Therapy on Non-healing Diabetic Leg Ulcers: A Case Series

Meenakshi Rahul Pandit[1], Vaishnavi Sheil Gupte[2], Karishma Shahaji Khedekar[3]

[1]Certified Matrix Rhythm Instructor, Dr.Randoll's Institute, Germany
[2,3]Physiotherapist, Certified Matrix Rhythm Therapy Practitioner, Maharashtra

Abstract

Background: Matrix Rhythm Therapy (MaRhyThe) is a recent treatment modality invented by Dr. Ulrich Randoll from Germany which helps in the rhythmic synchronisation of cells. It improves the tissue extensibility and increases the circulation which increases oxygenated blood followed by ATP synthesis and dissolution of the tension. The pathophysiology of non-healing diabetic leg ulcers is complex and leads to poor microcirculation and insufficient supply of oxygen. Hence, this study was undertaken to understand the effect of MaRhyThe in the treatment of non-healing diabetic leg ulcers.

Design: Case series

Patients: Two cases of non-healing diabetic leg ulcers who had received therapies but failed to heal before the referral were recruited.They were treated with MaRhyThe by trained physiotherapist until the wound healed and its effect was recorded.

Outcome measures: Photographic evidence

Results: The non-healing period for the diabetic leg ulcer cases was 52 weeks and 90 weeks and the healing period for the wounds was 25 days and 56 days respectively. In both the cases, proliferation was observed and improved with each MaRhyThe session until the wound closed.

Conclusion: Matrix Rhythm Therapy (MaRhyThe) is a safe, non-invasive and effective modality in treating non-healing diabetic leg ulcers.

Keywords: Non-healing ulcers 1, Matrix Rhythm Therapy 2, Diabetic ulcers 3, Chronic wounds 4

Introduction

Non-healing diabetic ulcers are a major health problem. Once an ulcer has developed, the risk of wound progressing to amputation increases. In up to 84% of cases, diabetic ulceration has been shown to precede amputation. The major cause of non-traumatic amputations is diabetes with rates being about 15 times higher than in the non-diabetic population [1].

The etiology of diabetic ulcers is multifactorial with major underlying causes to be oxidative stress, apoptosis and connexins. Increased oxidative stress in prolonged or uncontrolled Type 2 DM plays a crucial role in leading to an increase in apoptosis of lymphocytes which further leads to immune deficiency. Increased generation of reactive oxygen species (ROS) and connexins (gap junction proteins) in diabetes mellitus stimulates downstream apoptotic inflammatory signalling pathways which leads to delayed wound healing in diabetic ulcers. Due to the persistent hyperglycaemic state, endothelial cell

dysfunction and smooth cell abnormalities develop in peripheral arteries and small blood vessels and there is an increase in thromboxane A2 which is a vasoconstrictor and platelet aggregation agonist. This leads to an increased risk for plasma hyper-coagulability. In addition to this, a resultant decrease in endothelium-derived vasodilators leads to constriction. All the above events lead to poor microcirculation and prevent adequate tissue oxygenation which leads to non-healing chronic wounds [2].

Matrix Rhythm Therapy (MaRhyThe), developed by Dr. Ulrich Randoll, is a cell biological therapy which activates and rebalances specific physiological vibrations of skeletal muscle and nervous system. MaRhyThe has a frequency modulated between 8-12 Hz. An injured cell oscillates at an altered frequency thereby affecting the healing of the tissue. MaRhyThe reactivates the cell metabolism and normalises the physiological process by depth-effective rhythmical phase synchronous magneto-mechanical oscillations. In this process, the cells are stimulated and the entire tissue is rhythmically synchronised. It works and improves the tissue extensibility and increases the circulation which increases oxygenated blood followed by ATP synthesis and dissolution of the tension [3,4].

A positive effect of the Matrix Rhythm Therapy has been observed in non-diabetic venous ulcer healing, non-diabetic ulcers of the leg [5,6]. However, there is not enough evidence to support the effectiveness of MaRhyThe in non-healing diabetic leg ulcers. The objective of the present study was to determine the effect of MaRhyThe in the treatment of non-healing diabetic ulcers.

Two subjects having diabetes for 10-12 years were recruited for this study. They had an injury which was not healing. They received appropriate therapies but failed to heal before the referral. They were then treated with the MaRhyThe and their effect was noted. Non-diabetics, subjects having type 1 diabetes mellitus, Charcot's arthropathy, and Grade 3, 4 and 5 diabetic ulcers on Wagner's classification system [7] were excluded.

Case1:

A 66-year-old male diabetic patient under medication, having no heart condition and weighing 55kg, had an injury- part of a cycle hit over the postero-medial area of the right calf and was treated with antibiotics. The wound got infected in November 2019 for which medications were given and the patient was referred to a plastic surgeon whom he refused to visit.The non-healing period for case 1 was 52 weeks after which patient came to the clinic for further management. Patient was on no other management during the MaRhyThe treatment. Clinical findings: No complaint of pain. Wound appeared ischemic and non-healing. (Table 1)

Case 2:

A 75-year-old female diabetic patient under medication, having no heart condition and weighing 75kg, had a mosquito bite on the postero-medial area of the right calf in mid-2018 which was not healing. The patient underwent skin grafting in May 2019 which failed. The non-healing period for case 2 was 90 weeks. Patient then came to the clinic for further management. Patient was on no other management during the MaRhyThe treatment. Clinical findings: No complaint of pain. Wound appeared ischemic and non-healing. (Table 1)

Factors	**CASE 1**	**CASE 2**
Site of wound	Right Posteromedial lower 1/3rd aspect of calf	Right Posteromedial lower 1/3rd aspect of calf

Factors	CASE 1	CASE 2
Etiology	Trauma injury not healing due to diabetes	Mosquito bite not healing due to diabetes
Non-healing time	52 weeks	90 weeks
Grade on Wagner Ulcer Classification System	1	2
Age	66	75
Sex	Male	Female

Table 1: Case Details

Procedure

After obtaining informed consent from the patients, they were recruited according to the inclusion criteria. The subject was made to lie in the prone position on the plinth and the area to be treated was exposed and talcum powder was applied to prevent friction between the skin and matrix. MaRhyThe was applied on the area by a trained physiotherapist around the wound edges, and the entire affected limb (gluteal, hamstrings, calf, foot) with a focus on the calf, foot and sole area.

Treatment Protocol-

Case 1: 40 minutes per session, after every 2 days

Case 2: 40 minutes per session, after every 2 days

The efficacy of the treatment was measured by complete healing (closure) of the wound (100% re-epithelialisation) and supported by photographic evidence.

Results

The time required for wound closure for case 1 was 25 days and for case 2 was 56 days with the average time being 40.5 days. Case 1 took 8 sessions and case 2 needed 20 sessions for complete wound closure. The underlying cause of the ulcer was diabetes in all cases. Any signs or symptoms observed, examined or spoken of during the treatment or between sessions were to be noted however no such signs or symptoms were exhibited throughout the treatment. Patient reported an improved quality of life and satisfaction upon wound closure.

Case 1:

Fig 1: Pre MaRhyThe treatment

Fig 2: During the MaRhyThe treatment

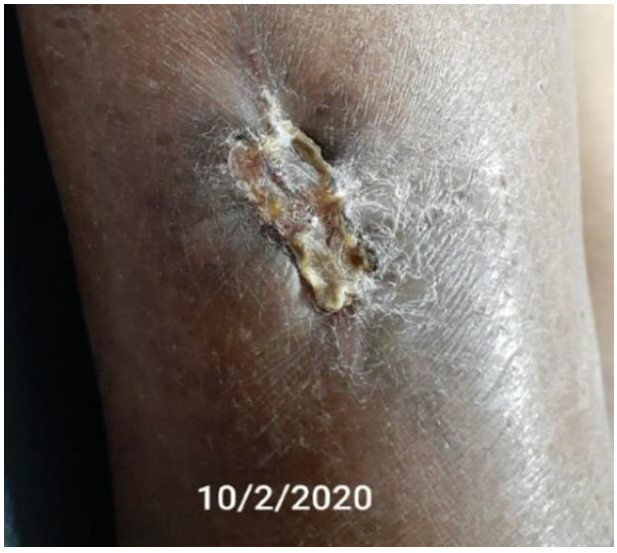

Fig 3: First follow up after the end of the MaRhyThe treatment

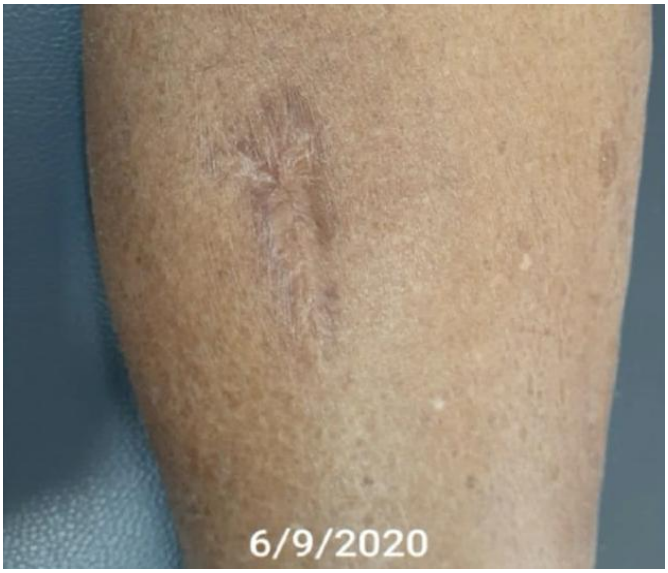

Fig 4: Follow up after 7months

Case 2:

Fig 1: Pre MaRhyThe treatment

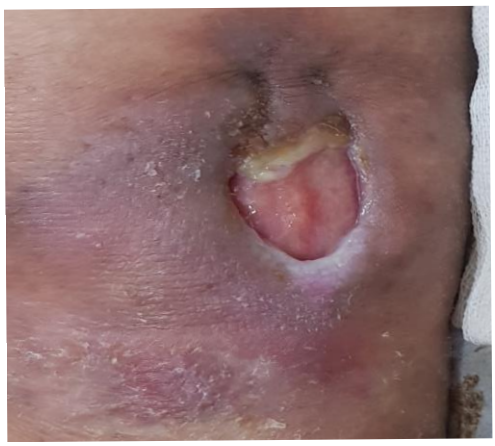

Fig 2: Post 1st MaRhyThe treatment session

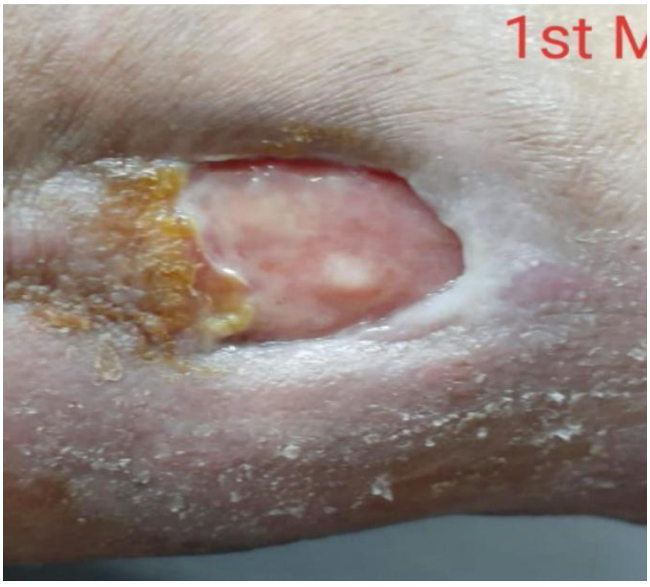

Fig 3: Post 3rd MaRhyThe treatment session

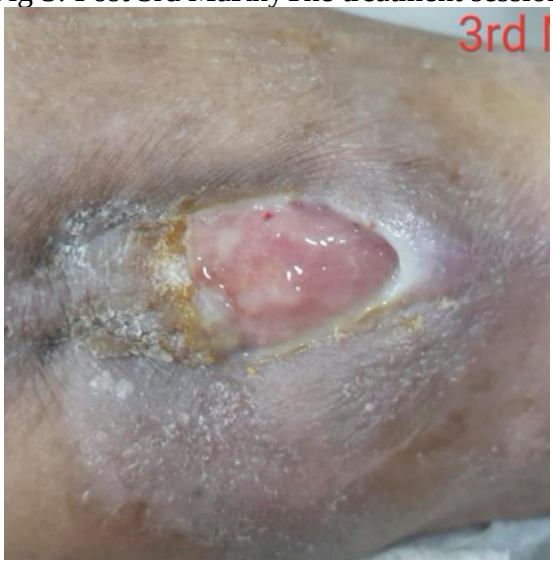

Fig 4Follow up after 7 months

Discussion

This study was carried out to evaluate the effect of MaRhyThe in non healing diabetic leg ulcers. Several studies have been conducted in animals showing the effect of vibrational therapies. Improved angiogenesis and collagen deposition, wound re-epithelialization, regeneration of lymph vessel, veno-venous anastomosis from scar to intact veins,reduced adhesion of the scar to the underlying tissue and progressive healing of wound are some of the effects which have been observed [8,9,10,11,12].

Present study evaluated the effect of MaRhyThe in non-healing diabetic leg ulcers. Diagnosed diabetic ulcers of two patients which were chronic and not healing were studied. Matrix Rhythm Therapy was administered to both the patients for 40 minutes per session. Proliferation was observed following on from the first treatment session and improved with every therapy session (Figures 1 to 4). The wound size visibly reduced as the treatment progressed ultimately to 100% re-epithelialisation and wound closure by the last session of treatment.

The process of wound healing involves 3 main phases- inflammatory, proliferative and remodelling and prolongation of any of these phases due to various causes leads to a chronic wound [13]. T lymphocytes play a central role in wound healing but their increased apoptosis leads to delayed wound healing and reduced lymphatic vessel formation in diabetic patients. Decreased collagen content due to dysfunctional fibroblasts in diabetics have been associated with poor wound strength, more susceptible to rupture and unstable framework for the cells to bind to.The extracellular matrix during an injury consists of various receptors and molecules facilitating different mechanisms responsible for wound healing. As angiogenesis process is affected in diabetes due to high glucose levels, reduced blood flow to the injury site leads to reduced oxygen supply to the wound [14,15].

MaRhyThe works on the extracellular matrix by micro-rhythmical stretching (micro-extension) thereby improving its elasticity and promoting healthy functioning by resynchronising the cells to the normal rhythm. The suction effect produced in the cells by the microscopic rhythmical vibrations help in transport of essential substances to and from the cells. MaRhyThe improves circulation which improves

the oxygen and micronutrient supply thereby promoting wound healing [16]. Limitation of the study was insufficient sample size due to a challenge in finding wounds of similar depth.

Conclusion

This case series concludes that MaRhyThe is a non-invasive, safe therapy and has exhibited effectiveness in healing non-healing diabetic ulcers however further research with larger sample size needs to be conducted.

Appendix

INFORMED CONSENT FORM OF THE PRIVATE CLINIC

Information of the private clinic-

The physiotherapy clinic is known for its holistic approach towards all Orthopedic, Gynecologist, ENT, Sports Medicine alignments. The therapies consist of Matrix Rhythm Therapy, Magnetodyn, Ultralign IFT and behavioral exercises, games and activities designed specifically to prevent and reverse a series of disorders. These therapies are designed by scientists and doctors and safety measures are prescribed for each of them, which I have gone through.There will be no injection or medication incorporated or prescribed through the therapy. The Physical therapists who are licensed by OTPT Council and are a member of an IAP member teach you to do exercises and activities and also make you aware of the safety precautions.

I _____, undersigned hereby expressly and affirmatively state that I wish to participate in the therapy for the rehabilitation of my condition. I hereby declare that I am aware that: -

1. I need to follow the right technique while exercising as prescribed by the instructor.
2. I need to inform the Instructor/Consultant immediately of any sudden pain/odd symptom during or after the exercise.
3. Adequate diet, correct medication as prescribed by the physician and attending the sessions regularly will be beneficial for the results I need to achieve, though no guarantee of success has been given to me.
4. 4)I have shared all my medical details including health status, family history, ongoing treatment and other required information completely to the therapist. I also take the responsibility of communicating to the therapist about any physical and psychological concerns that might conflict with participation in activity.
5. I may be exposed to many inherent risks, including but not limited to falls, accidents, injury, risks by contact with other participants or risks involved while using electrical equipment's, and all other such risks which are inherent to all sports and exercises.
6. I agree to treatment by a male therapist if required - YES/NO
7. I agree that the information/photos/video obtained may be used and published for statistical and scientific purpose.

By my signature, I indicate that I have read and understood this Consent form. I also declare that I had an opportunity to ask questions and any such questions have been answered to my complete satisfaction. I voluntarily agree to its terms.

I am legally entitled to sign this consent form.

Signature of the patient
Name
Date
Signature of the Therapist
Name
Date

References

1. J. Clin. Invest. 117:1219–1222 (2007). doi:10.1172/JCI32169.
2. Arya AK, Tripathi R, Kumar S, Tripathi K. Recent advances on the association of apoptosis in chronic non healing diabetic wound. World J Diabetes 2014; 5(6): 756-762 Available from: URL: http://www.wjgnet.com/1948-9358/full/v5/i6/756.htm.
3. Randoll UG, Hennig FF. Coherent rhythms (timing frequencies) in biological systems as a basis for the matrix-rhythm-therapy. In: 2nd European Congress 'Achievements in Space Medicine into Health Care Practice and Industry 2003.
4. https://www.marhythe-systems.de/en/die-therapie/
5. Ketan Bhatikar. Effect of Matrix Rhythm Therapy on Chronic Vein Dysfunction Deep Foot Ulcer: A Case Report. J Yoga & Physio. 2018; 6(5): 555696. DOI: 10.19080/JYP.2018.06.555696.
6. Harish Kumar Rajendran. Effect of Matrix Rhythm Therapy in Venous Ulcer Healing: A case report. Int J Physiother Res 2021;9(5):4040-4043. DOI: 10.16965/ijpr.2021.187
7. Wagner FW. The diabetic foot. Orthopedics. 1987;10:163-72.
8. Wachche GS, Bhagwat S, Talpalikar M, et al. Response of Heterogeneous Ulcers of Leg to Matrix Rhythm Therapy: A Case Series. J Foot Ankle Surg (Asia-Pacific) 2023;10(3):156–160.
9. Weinheimer-Haus EM, Judex S, Ennis WJ, et al. Low-intensity vibration improves angiogenesis and wound healing in diabetic mice. PLoS One 2014;9(3):e91355. DOI: 10.1371/journal.pone.0091355
10. Leduc A, Lievens P, Dewald J. The influence of multidirectional vibrations on wound healing and regeneration of blood and lymph vessels. Lymphology 1981;14(4):179–185. PMID: 7334835.
11. Roberts Rita E., Bilgen Onur, Kineman Rhonda D., Koh Timothy J.Parameter-Dependency of Low-Intensity Vibration for Wound Healing in Diabetic Mice. Frontiers in Bioengineering and Biotechnology ISSN=2296-4185 vol. 9, year 2021 DOI=10.3389/fbioe.2021.654920
12. Syabariyah, S.; Nurachmah, E.; Widjojo, B.D.; Prasetyo, S.; Sanada, H.; Irianto; Nakagami, G.; Suriadi; Kardiatun, T.; Hisan, U.K. The Effect of Vibration on the Acceleration of Wound Healing of Diabetic Neuropathic Foot Ulcer: A Prospective Experimental Study on Human Patients. Healthcare 2023, 11, 191. https://doi.org/10.3390/ healthcare11020191
13. Han, G., Ceilley, R. Chronic Wound Healing: A Review of Current Management and Treatments. Adv Ther 34, 599–610 (2017). https://doi.org/10.1007/s12325-017-0478-y
14. James Gailit and Richard AF Clark. Wound in the context of extracellular matrix Current Opinion in Cell Biology 1994, 6:717-725
15. Blakytny R, Jude E. The molecular biology of chronic wounds and delayed healing in diabetes. Diabet Med. 2006 Jun;23(6):594-608. doi: 10.1111/j.1464-5491.2006.01773.x. PMID: 16759300.
16. How Matrix Rhythm Therapy works https://www.dr-randoll-institut.de/en/so-wirkt-die-matrix-rhythmus-therapie-marhythe/