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Effectiveness of Matrix Rhythm Therapy Physiotherapy in the Management of Hyperglycaemia in Type II Diabetes Mellitus

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Abstract

Matrix Rhythm Therapy (MaRhyThe®) is a therapeutic modality based on the principle of physiologic rhythmic oscillations of body cells. This study aimed to evaluate the effectiveness of Matrix Rhythm Therapy in managing hyperglycemia and symptoms associated with type II diabetes mellitus. A quasi-experimental design was adopted with 50 participants selected based on specific criteria and equally divided into experimental (n=25) and control (n=25) groups using simple random sampling. The experimental group received one session of Matrix Rhythm Therapy per week for 12 weeks in conjunction with conventional therapy, which included exercise and dietary advice, while the control group received only conventional therapy for the same duration. Pretest measurements of glycosylated hemoglobin (HbA1c) and the Diabetes Symptom Self-Care Inventory were recorded, and post-test values were analyzed after 12 weeks using SPSS (IBM SPSS Statistics Version 26). Descriptive statistics were used to analyze demographic and disease-related characteristics, while the Shapiro–Wilk test determined the normality of the groups. Pre-homogeneity was assessed using the Chi-square test, independent t-test, and Fisher's exact test, and post-intervention differences between the groups were examined using an independent t-test. Statistical significance was set at $p < 0.05$. The findings concluded that Matrix Rhythm Therapy, as an adjunct to conventional treatment, effectively manages hyperglycemia and alleviates symptoms associated with diabetes mellitus.

Keywords: *Diabetes Mellitus, Matrix Rhythm Therapy, Diet, Exercises.*

1. Introduction

Diabetes mellitus is a metabolic syndrome with multiple etiologies in which there will be a disturbance in insulin secretion or insulin action or both; this results in chronic hyperglycemia due to defects in carbohydrate, protein, and fat metabolism (1). According to our clinical observations, we hypothesize that it could also be a sugar utilization disorder because of blockages of flow in the Extracellular Matrix (ECM) in the transit area between capillaries and parenchymal cells. In South India, the prevalence was 19.1% in the year 2002. It is estimated that a significant percentage of cases of diabetes (30–80%, depending on the country) are undiagnosed. Diabetes comprises many disorders characterized by hyperglycemia (2).

According to the current classification, there are two major types: type 1 diabetes

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(T1DM) and type 2 diabetes (T2DM). The distinction between the two types has historically been based on age at onset, degree of loss of β-cell function, degree of insulin resistance, presence of diabetes-associated autoantibodies, and the requirement for insulin treatment for survival. However, none of these characteristics unequivocally distinguish one type of diabetes from the other, nor account for the entire spectrum of diabetes phenotypes. Heterogeneous etiopathology includes defects in insulin secretion, insulin action, or both, and disturbances of carbohydrate, fat, and protein metabolism. The long-term specific effects of diabetes include retinopathy, nephropathy, and neuropathy, among other complications. People with diabetes are also at increased risk of other diseases, including heart, peripheral arterial, and cerebrovascular disease, obesity, cataracts, erectile dysfunction, and nonalcoholic fatty liver disease. They are also at increased risk of some infectious diseases, such as tuberculosis. Diabetes may present with characteristic symptoms such as thirst, polyuria, blurring of vision, and weight loss. Genital yeast infections frequently occur.

The most severe clinical manifestations are ketoacidosis or a non-ketotic hyperosmolar state that may lead to dehydration, coma, and, in the absence of effective treatment, death. However, in T2DM, symptoms are often not severe or may be absent, owing to the slow pace at which the hyperglycemia is worsening. As a result, in the absence of biochemical testing, hyperglycemia sufficient to cause pathological and functional changes may be present for a long time before a diagnosis is made, resulting in the presence of complications at diagnosis. Diabetes complications, particularly macro and microvascular diseases, are the leading cause of reduction in the quality of life of patients and an increase in diabetic mortality. Previously, large-scale meta-analyses have indicated that prediabetes is associated with an increased risk of cardiovascular diseases. Therefore, prevention of diabetes and its severe complications is urgently needed.

Currently, a growing number of clinics and patients pay more attention to non-pharmacological strategies due to hypoglycemic agents having a limited role in the progression of diabetes and its complications. Different non-pharmacological strategies have been reported, including lifestyle change, dietary modification, physical activity, and exercise with different intensities, with favorable and unfavorable records on diabetes and its complication prevention and development. Learning about the disease and actively participating in the treatment is important since complications are far less common and less severe in people who have well-managed blood sugar levels. Per the American College of Physicians, the goal of treatment is an HbA1C level of 7-8%. Attention is also paid to other health problems that may accelerate the negative effects of diabetes (5).

The principles of managing diabetes may be similar across the general population with diabetes; however, some considerations may need to be addressed when tailoring intervention, mainly in special populations. It is known that artificial insulin causes chronic inflammation by immune reactions with resulting fibrotic tissue and further degenerative processes. Hence, a perfect alternative might be using specific physical therapies already on an extracellular level with following movement and sports training instead of giving artificial insulin to control the sugar household. Physiotherapy assessment and management include educating the patient on managing blood sugar levels and screening the patients annually.

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However, there is a need for novel therapeutic approaches with no added side effects. Following the ideas of systems biology and the studies of the interaction of time-space patterns in living systems, a physical therapy device called Matrix mobil was constructed at the University of Erlangen/Nuremberg in the 1990s. The target was to reactivate and synchronize the human body with its corresponding processes on the level of cellular units surrounded by its extracellular matrix. It works on the principle of rhythmic oscillations of the body cells. It helps to symmetrically improve circulation and lymphatic flow in the treated area. It also helps regulate circadian rhythm and bring the body's cells 'in harmony'. The various studies on MaRhyThe® have proved its effect on pain and improved functionality in different musculoskeletal conditions.

Matrix Rhythm Therapy is a vibrational therapy directed at the skeletal musculature. This therapy stimulates the natural rhythm of the musculature and acts indirectly to regulate the processes coupled with it. As a result, the natural tissue vibration is restored, and the cellular logistics are optimized. Matrix Rhythm Therapy was developed by Dr. Ulrich G. Randoll at the University of Erlangen/Nuremberg, Germany. Dr. Randoll found that our cells are also rhythmically pulsating at a frequency of 8-12 Hz in normal healthy conditions. During unhealthy situations, these movements are slowed down. Matrix Rhythm Therapy provides pulsations in the same frequency to synchronize and reset the disturbed cell rhythm. It helps to reestablish extracellular logistics, i.e., the removal of waste products and improve microcirculation of oxygenated blood. It relaxes muscles and enhances the process of regeneration and healing.

The importance of the sympathetic trunk for the therapy of many chronic illnesses is well established, including especially conditions related to stress. For the reduction of load on the sympathetic nervous system, Matrix Rhythm Therapy is initiated paravertebrally along the sympathetic trunk, and then further along the major nerve plexus. This also corresponds to the course of the meridian and overlaps with the use of acupuncture points in TCM and Chakras in Yoga/Ayurveda. Matrix Rhythm Therapy of the sympathetic trunk can achieve a generalized improvement in the function of organs along the vagus nerve, restoring the sympatho-vagal balance overall. Body functions thereby recover their natural equilibrium, i.e., maintaining the blood sugar levels within the normal range.

2. Materials and methodology

Research Design

This quasi-experimental study aimed to verify the effectiveness of Matrix Rhythm therapy for the management of Hyperglycaemia in type 2 diabetic patients.

Participants

This study included patients diagnosed with type 2 DM attending the outpatient department of Vinayaka Missions Kirupananda Variyar Medical college and Hospital. The inclusion criteria were as follows: aged 30 to 60 years with HbA1C levels between 6.5% to 10% were only included. The exclusion criteria were as follows: patients who used insulin pumps, were hospitalized with diabetes complications. The sample size was determined

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utilizing the G*Power 3.1 software with an effect size (d) of 0.81, significance level (α) of 0.05, power (β) of 0.80, and two-tailed independent t-test based on previous studies. Consequently, a total of 50 participants (25 in each group) were required, and 58 participants were intended to be recruited, considering a 15% dropout rate.

Type 2 diabetic patients were willing to participate, after being introduced to the study program by their Physiotherapist, were assigned to the experimental group, whereas those who did not want to use Matrix Rhythm Therapy were assigned to the control group. In this study, After we excluded 2 patients who did not meet the inclusion criteria and 4 patients who refused to participate after being informed about the study's duration and methods, 60 patients were included in the study, During this study, one patient in the experimental group moved out of the country and one patient in the control group passed away from another condition and 8 of them discontinued the treatment for various reasons, leaving 25 patients in each of the experimental and control groups; therefore, a total of 50 patients were included in the final analysis.

Data Collection and Procedure

Data collection was conducted from 7 June 2024 to 26 September 2024, and informed consent was obtained. They assessed the program's structure and content using established criteria, with all components achieving validation scores above 0.80, indicating strong content validity and reliability. The study was conducted for three months with 50 patients from the outpatient clinic at the same hospital. Before the implementation of the program, a pre-test Hba1c are Measured. A post-test on test Hba1c was Measured at the end of the 12-week program.

Intervention

The intervention in experimental group involves Matrix Rhythm Therapy for 1 session in a week for a period of 12 weeks with each session lasting for 60 minutes. The subjects will be permitted to continue the conventional medical management as prescribed by the Physician along with recommended diet and exercise at the end of intervention, HbA1C evaluation will be recorded as post intervention scores.

Outcome Assessment:

Glycosylated hemoglobin (HbA1c)- HbA1c was measured using an HbA1c analyzer Diabetes Symptom Self-Care Inventory- It consists of 20 items in five domains rated on a 5-point Likert scale. Higher scores indicate a higher frequency of symptoms

Statistical Analysis

The data were analyzed using SPSS (IBM SPSS statistics version 26; IBM Inc., Chicago, IL, USA). The demographic and disease-related characteristics of the participants were analyzed using descriptive statistics; the Shapiro–Wilk test was conducted to determine the normality of the experimental and control groups. ; the Chi-square test, the independent t-test, and Fisher's exact test were conducted to examine the pre-homogeneity

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of the two groups; and an independent t-test was conducted to examine differences between the two groups after the intervention. The statistical significance was set at $p < 0.05$.

Outcomes	Experimental(n=25) M ± SD	Control(n=25) M± SD	t or χ^2	p
Diabetic Symptoms-Thirst and Fatigue	12.56 ± 5.93	11.00 ± 4.06	1.09	0.284
HbA1c (%)	10.76 ± 2.78	9.60 ± 1.92	1.71	0.093

3. Outcome Analysis

The study included a total of 50 participants, 25 in each group. Regarding sex, there were 14 (56.0%) females in the experimental group and 15 (60.0%) in the control group, with a mean age of 53.96 ± 9.77 years in the experimental group and 54.92 ± 11.73 years in the control group. The duration of diabetes was 12.39 ± 8.30 years in the experimental group and 10.31 ± 8.12 years in the control group, and the most common treatment of diabetes was a combination of oral hypoglycemic agents and insulin, which was used by 16 participants (64.0%) in the experimental group and 15 (60.0%) in the control group. The HbA1c was 10.76% ± 2.78% in the experimental group, which exceeded that of the control group (9.60% ± 1.92%); however, no statistically significant difference was observed. In the above analysis, the homogeneity test for sociodemographic characteristics, disease-related characteristics, main variables, and physiological indices of the participants indicated no statistically significant differences between the two groups, indicating that the experimental and control groups were homogeneous.

4. Result and Discussion

As a result of measuring the frequency of diabetes symptoms And HbA1c levels after the intervention, a significant decrease in the frequency thirst–fatigue symptoms ($p = 0.049$).And as a result of testing HbA1c there is significant reduction ($t = -3.83$, $p < 0.001$)were observed in the experimental group compared with the control group;

This study was aimed to determine whether Matrix Rhythm Therapy could reduce the Blood Glucose levels in patients with Type II Diabetes Mellitus. The experimental group, which Included Matrix Rhythm Therapy along with conventional therapy showed a decrease thirst–fatigue, neurological, and gastrointestinal comfort symptoms compared with the control group, which adhered to the usual diabetes treatment regimen. When diabetic patients become hypoglycemic, they may experience psychological symptoms such as anxiety, palpitations, sweating, irritability, anger, and sleep disturbances (6). The most significant reduction in these symptoms appears to have been due to the prevention of hypoglycemia during the 12-week intervention period. Given that no patients at the hospital had hypoglycemia during the study, this intervention appears to be helpful for

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patients on insulin therapy who fear hypoglycemia.

5. Conclusion:

Finally, among the Hba1c levels of the experimental group HbA1c is significantly reduced there by improving the glucose tolerance. Given that the management of HbA1c is essential for slowing the progression of the disease and preventing complications in type diabetes this study shows Matrix rhythm therapy is meaningful and effective Adjunct to improve diabetes related Hyperglycemia along with conventional therapy

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