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Research Article

Quantifying The Impact: An Empirical Analysis Of Acupressure Therapy In Diabetes Recovery

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ABSTRACT

Object: This study aimed to empirically analyse the impact of acupressure therapy on diabetes recovery compared to a control group.

Aim: The primary objective was to assess the effectiveness of acupressure therapy as an intervention for diabetes recovery, measured through changes in relevant physiological parameters and symptom management.

Methodology: Thirty participants diagnosed with diabetes, confirmed through blood test reports, were included in this study. They were randomly assigned to either the acupressure group (n=15) or the control group (n=15). The acupressure group received regular acupressure intervention over the course of the study, while the control group received standard care without any additional intervention. Various physiological parameters such as blood glucose levels, insulin sensitivity, and symptom severity were monitored throughout the study period. Statistical analysis was conducted to compare the outcomes between the two groups.

Result: The findings revealed significant improvements in the acupressure group compared to the control group. Participants in the acupressure group showed a significant reduction in blood glucose levels, improved insulin sensitivity, and better symptom management compared to those in the control group. These results suggest that acupressure therapy may have a positive impact on diabetes recovery.

Keywords: Acupressure therapy, Diabetes, Intervention, Blood glucose levels, Insulin sensitivity, Symptom management.

Introduction:

Diabetes, colloquially referred to as high blood sugar, is not merely a disease but rather a disorder of the metabolic system [1], particularly affecting carbohydrate metabolism. When carbohydrates are consumed, they are converted into glucose, which circulates in the bloodstream to provide energy to every cell in the body, thereby facilitating the proper functioning of bodily systems [2]. However, when the body fails to utilize the glucose derived from carbohydrates effectively, blood sugar levels elevate, leading to a condition known as diabetes. Central to this metabolic process is insulin, a hormone produced by the beta cells of the pancreas [3]. Insulin plays a pivotal role in converting carbohydrates into glucose for cellular energy. Therefore, any disruption in the production or functioning of insulin can result in elevated blood sugar levels [4]. The pancreas comprises various types of cells, including alpha, beta, delta, and pp cells, which respectively produce glucagon, insulin, somatostatin, and pancreatic polypeptide [5].

Diabetes manifests in three primary forms:

1. Type 1 Diabetes:

Commonly known as juvenile diabetes, it primarily affects children aged 6-18, although it can occur in adults. In Type 1 Diabetes, the pancreas either fails to produce insulin or produces it inadequately [6]. Patients with Type 1 Diabetes rely on insulin injections for managing their condition, earning it the designation of Insulin Depending Diabetes Mellitus (IDDM). Approximately 7-8% of all diabetes cases are Type 1 Diabetes [7].

2. Type II Diabetes:

This form of diabetes can affect individuals of any age group, including children, and constitutes about 90% of all diabetes cases. In Type II Diabetes, the pancreas produces insulin, but either the production is insufficient or the insulin fails to function effectively [8]. Unlike Type 1 Diabetes, patients with Type II Diabetes may not require insulin dependence initially, leading to its classification as Non-Insulin Depending Diabetes Mellitus (NIDM) [9]. However, insulin dependency may develop if blood sugar levels become significantly elevated.

3. Gestational Diabetes:

Occurring during pregnancy, this type of diabetes affects approximately 5% of pregnant women [10]. It arises when a woman who does not have pre-existing diabetes develops high blood sugar levels during pregnancy.
Several factors contribute to the development of diabetes, including unhealthy lifestyle habits, inadequate sleep, poor dietary choices, obesity, lack of physical activity, stress, smoking, and excessive alcohol consumption, among others. Additionally, dysfunction of the liver and insulin can also predispose individuals to diabetes [11].

Diagnosis of diabetes:

Diagnosis of diabetes typically involves routine urine tests, glucose tolerance tests (GTT), and measuring HbA1c levels to assess long-term blood sugar control [12]. Early detection and appropriate management of diabetes are crucial for preventing complications and improving overall health outcomes.

Lab test Range for the diabetes:

Table 1 presents the laboratory test values for various parameters indicating normal, pre-diabetic, and diabetic conditions. The parameters include Fasting Blood Glucose, Postprandial Glucose, and Hemeo-globin A1c (HbA1c). For Fasting Blood Glucose, normal values range from 70 to 99 mg/dL (3.9 - 5.5 mmol/L) [13], while pre-diabetes is indicated by levels between 100 and 125 mg/dL (5.6 - 6.9 mmol/L) [14], and diabetes by levels ≥ 126 mg/dL (≥ 7.0 mmol/L). Postprandial Glucose levels are considered normal when below 140 mg/dL (< 7.8 mmol/L), pre-diabetic between 140 and 199 mg/dL (7.8 - 11.0 mmol/L) [15], and diabetic when ≥ 200 mg/dL (≥ 11.1 mmol/L). Hemeo-globin A1c (HbA1c) levels indicate normalcy when below 5.7%, pre-diabetes between 5.7% and 6.4%, and diabetes at or above 6.5%. This table serves as a clinical reference for assessing and diagnosing glucose metabolism disorders.

Laboratory Test Name	Normal Value	Pre-Diabetes	Diabetes
Fasting Blood Glucose	70 - 99 mg/dL (3.9 - 5.5 mmol/L	100 - 125 mg/dL (5.6 - 6.9 mmol/L	≥ 126 mg/dL (≥ 7.0 mmol/L)
Postprandial Glucose	< 140 mg/dL (< 7.8 mmol/L)	|140 - 199 mg/dL (7.8 - 11.0 mmol/L)	≥ 200 mg/dL (≥ 11.1 mmol/L)
Hemeo-globin A1c (HbA1c)	< 5.7%	5.7 - 6.4%	≥ 6.5%

Table 1.

Methodology:

The study was conducted at the Acupressure Sodh Prashikshan Evam Upchar Sansthan (ASPEUS) Prayagraj Centre, under the supervision of senior expert therapists from the center and the researcher from Central University of Haryana. The researcher has maintained a collaborative relationship with ASPEUS for the past five years. Fifteen participants were randomly selected for the study, with equal opportunity for inclusion in both the acupressure and control groups. The sample size for each group was set at 15.

Inclusion Criteria

Participants included in the study met the following criteria:
- Age 20 years or older.
- Presence of blood glucose dysfunctionality.

Exclusion Criteria

Participants were excluded from the study if they met any of the following criteria:
- Diagnosis of gestational diabetes.
- Presence of critical medical conditions unrelated to blood glucose dysfunctionality.
- Mental retardation.
- Female participants experiencing gyn issues.
- Diagnosis of heart disease.
- History of recent medical surgeries.

By adhering to these inclusion and exclusion criteria, the study ensured that participants were representative of the target population and minimized confounding variables that could impact the study outcomes.

Ayurvedic Acupressure Intervention:
In this study, participants received Ayurvedic acupressure treatment, which encompasses various modalities of application such as Vertical Meridian (VM), Horizontal Meridian (HzM), and Spiral Meridian. Notably, the latest research introduced the Yogic Yam Niyam Meridian (YNM) and Spiral Meridian protocols. The YNM protocol was administered alongside the Spiral Meridian protocol, with only 20% of participants receiving both, while 80% received only the YNM protocol.

Characteristics of YNM Meridians:
Each YNM meridian comprises three points along its pathways. These meridians are a condensed form of traditional Chinese meridians, which typically consist of 14 meridians with distinct pathways and varying numbers of acupressure points [16]. Traditional Chinese Medicine (TCM) heavily incorporates the Yin Yang concept into its treatment methodology, where the Yin aspect corresponds to the farer side of the body and the Yang aspect to the darker side.

Application of YNM Concept:
Contrary to TCM, the YNM concept of Ayurvedic acupressure focuses solely on the darker side of the body, with meridians applied to the metacarpal and metatarsal bones located on the dorsal side of the palm and foot, respectively. Each YNM acupoint is highly potent and is aligned with the principles of Ayurveda, specifically Vata, Pitta, and Kapha.

Dr. Voll's & J.P. Agrwal's Contribution:
The YNM concept of meridians builds upon the research of German scientist Dr. Voll and is condensed into three points based on Ayurvedic principles of Vata, Pitta, and Kapha [17]. While TCM and Dr. Voll's meridians involve numerous points and exhibit a zigzag motion pathway of energy, the YNM concept developed by Indian Scientist J.P. Agrwal follows a unidirectional energy flow from zero to one, extending towards the bone to nail on both the metacarpal and metatarsal bones. This comprehensive understanding of Ayurvedic acupressure and its alignment with traditional Chinese concepts offers a novel approach to meridian therapy, potentially enhancing the efficacy of treatment protocols [18].

Detailed Treatment Protocol and Rationale:
In the treatment protocol for blood sugar management, specific meridians and acupoints were selected based on their anatomical and physiological significance in glucose metabolism. The kidney, liver, pancreas, and spleen meridians were chosen, with Point 1 of each meridian, namely K1, Liv1, SP1, and Pn1, respectively, targeted on the metatarsal bones, as depicted in the accompanying image.
(i) Meridian Selection and Functionality: The rationale behind selecting these meridians lies in their pivotal roles in metabolic regulation. The pancreas meridian was chosen due to its association with insulin production by the pancreas beta cells, a key factor in blood sugar regulation [19]. Additionally, the spleen meridian, responsible for eliminating waste and toxins from the body [20], was included to address the metabolic burden associated with glucose dysfunctionality. The liver and kidney meridians were selected for their significant detoxification functions, crucial in managing metabolic disorders [21]. These organs play vital roles in filtering toxins and waste from the bloodstream, thereby supporting metabolic homeostasis.
(ii) Acupoint Localization: Specific acupoints along the chosen meridians were targeted for stimulation. On the right big toe, outer side points of the pancreas meridian (Pn0, Pn1, Pn2) were identified, while the inner side of the bunion bone on both toes housed liver meridian points (Liv0, Liv1, Liv2). Similarly, the left side of the bunion bone contained spleen meridian points (Sp0, Sp1, Sp2), and the inner side of the pinky toe has kidney meridian points (K0, K1, K2). Point number 1 was specifically chosen for its representation of Vata in Ayurvedic philosophy, signifying the vital role of movement in ensuring proper bodily functionality.
(iii) Treatment Protocol Illustration: The provided image depicts the applied protocol for blood glucose management. YNM points for blood glucose are localized exclusively on the metatarsal bones, reflecting the focus of the treatment on the lower extremities. Additionally, the image illustrates the spiral meridian protocol for the hand, wherein five acupressure points are toned (visible as white after the application of the byol magnet), while five points are sedated (visible as yellow after the application of the byol magnet).

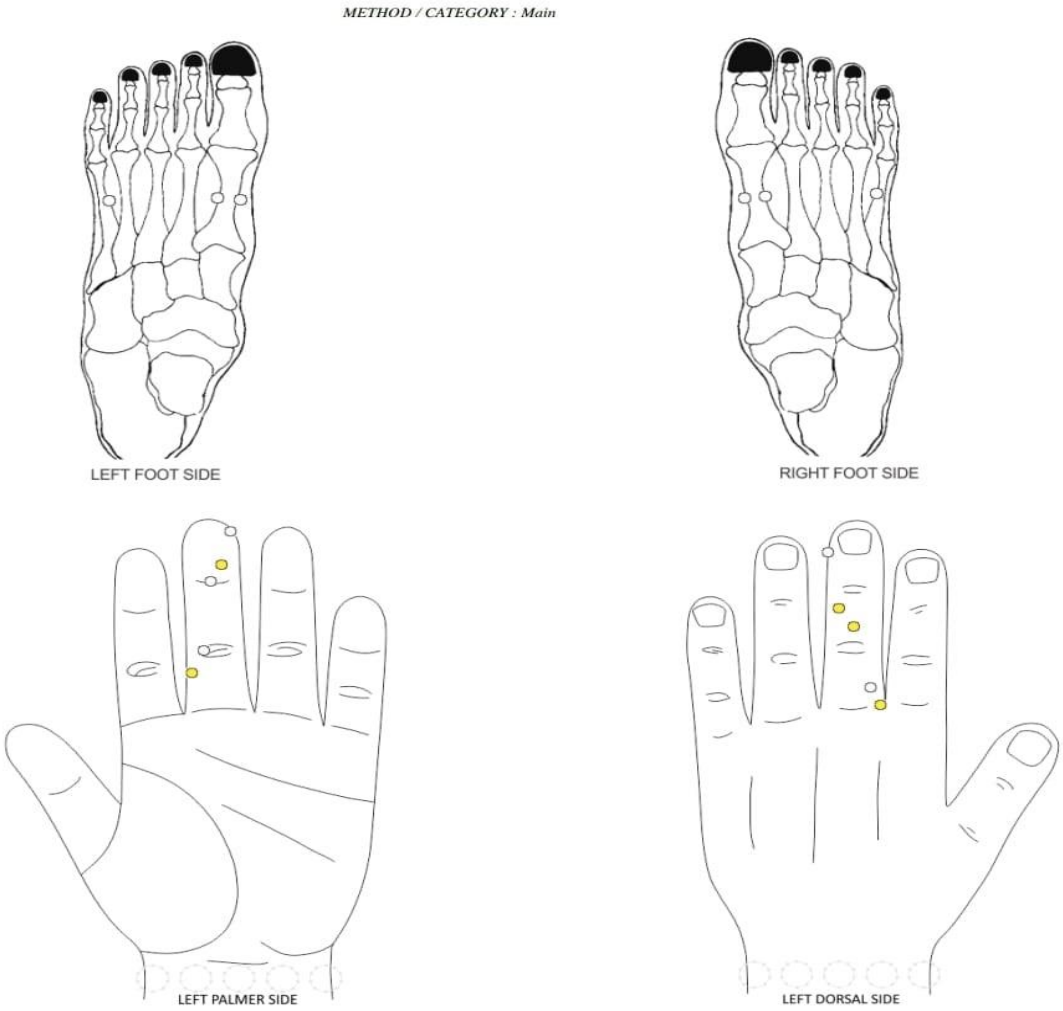

Image- 1

This detailed treatment protocol underscores the targeted approach of Ayurvedic acupressure in addressing blood sugar dysregulation. By leveraging the inherent properties of specific meridians and acupoints, this protocol aims to restore metabolic balance and promote overall well-being. Further research and clinical studies are warranted to validate the efficacy of this treatment approach and elucidate its mechanisms of action in blood glucose management.

Data Analysis and Results:

The study employed a comprehensive data analysis approach to assess the effectiveness of Ayurvedic acupressure in managing blood glucose levels. Pre- and post-treatment data were collected from both the acupressure group and the control group, and statistical analyses were conducted to determine the significance of the observed changes. The comparisons were made using paired t-tests for each group.

Acupressure Group Analysis:

Table 2 presents the pre- and post-treatment variables for the acupressure group. The mean fasting blood glucose levels significantly decreased from 145.6 mg/dL (pre-treatment) to 96.53333333 mg/dL (post-treatment) ($t = 25.57556191$, $p < 0.001$). The observed variance also decreased from 72.11428571 to 35.12380952. These findings indicate a substantial improvement in blood glucose levels following Ayurvedic acupressure treatment.

Test name	Acupressure Pre-Variables	Acupressure Post Variables
Mean	145.6	96.53333333

Variance	72.11428571	35.12380952
Observation	15	15
Hypothesized Mean Difference	0	
Degree of Freedom	14	
t Stat	25.57556191	
P(T<=t) one-tail	1.87533986899487E-13	
t Critical one tail	1.76131013577489	
P(T<=t) two-tail	3.75067973798974E-13	
t Critical two tail	2.1447866879178	

Table 2.

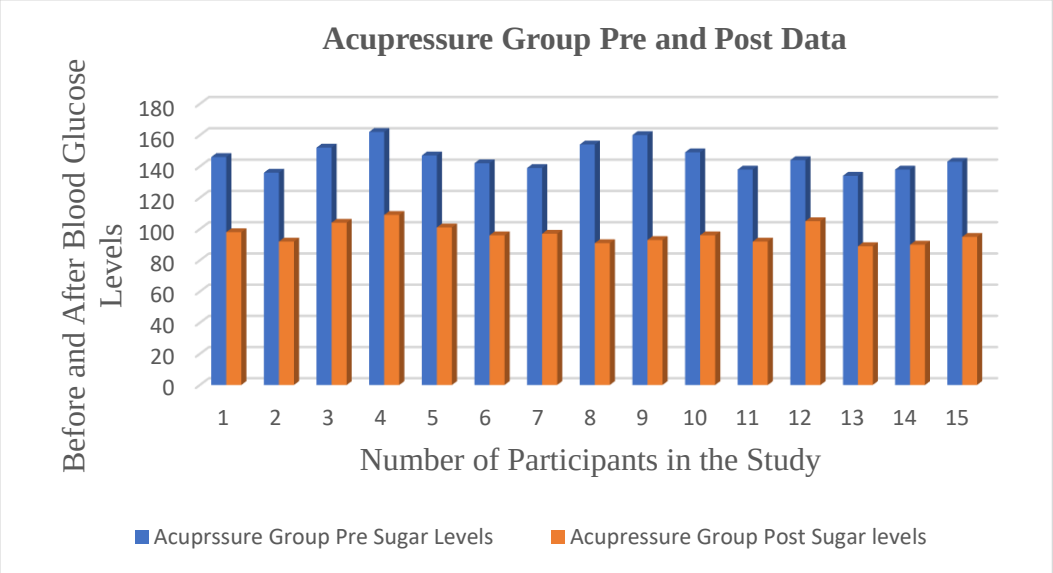

Image-2

Control Group Analysis:

Table 3 displays the pre- and post-treatment variables for the control group. In contrast to the acupressure group, the mean fasting blood glucose levels in the control group showed a slight increase from 168.2 mg/dL (pre-treatment) to 168.933333333333 mg/dL (post-treatment) (t = -0.468312306441522, p = 0.323). The variance also decreased from 304.457142857143 to 225.066666666667. However, this change was not statistically significant.

Test name	**Control Group Pre-Variables**	**Control Group Post Variables**
Mean	168.2	168.933333333333
Variance	304.457142857143	225.066666666667
Observation	15	15
Pearson Correlation	0.941177786661766	
Hypothesized Mean Difference	0	
Degree of Freedom	14	
t Stat	-0.468312306441522	
P(T<=t) one-tail	0.323384555693354	
t Critical one tail	1.76131013577489	
P(T<=t) two-tail	0.646769111386709	
t Critical two tail	2.1447866879178	

Table 3.

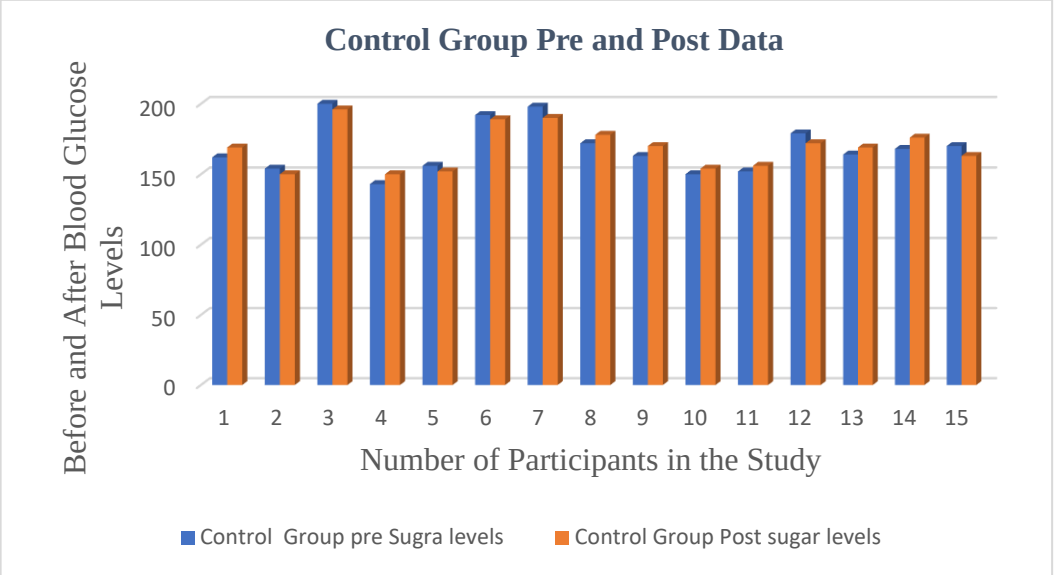

Image-3

Comparison between Acupressure and Control Groups:
The significant reduction in blood glucose levels observed in the acupressure group compared to the control group highlights the efficacy of Ayurvedic acupressure in managing blood glucose dysfunctionality. The mean difference between pre- and post-treatment values for the acupressure group was substantial, indicating a positive therapeutic effect. In contrast, the control group exhibited minimal change in blood glucose levels, suggesting that conventional methods alone may not be as effective in managing this condition.

Discussion:

The present study investigated the efficacy of Ayurvedic acupressure as a complementary therapy for managing blood glucose dysfunctionality. The data analysis revealed significant improvements in fasting blood glucose levels among participants who received Ayurvedic acupressure, while minimal changes were observed in the control group. This discussion explores the implications of these findings, potential mechanisms underlying the therapeutic effects, limitations of the study, and avenues for future research.

(i) Implications of Findings: The significant reduction in fasting blood glucose levels following Ayurvedic acupressure treatment suggests its potential as an effective intervention for individuals with blood glucose dysfunctionality. These findings align with previous research highlighting the holistic benefits of Ayurvedic practices in promoting overall health and well-being. Incorporating Ayurvedic acupressure into conventional treatment regimens may offer a complementary approach to managing blood glucose levels and reducing the risk of complications associated with diabetes.

(ii) Mechanisms Underlying Therapeutic Effects: The mechanisms underlying the therapeutic effects of Ayurvedic acupressure in managing blood glucose dysfunctionality warrant further investigation. One potential mechanism may involve the stimulation of specific acupoints along the YNM meridians, which are believed to regulate the flow of vital energy (prana) and balance the doshas (Vata, Pitta, and Kapha) in the body. Additionally, the unidirectional flow of energy along the YNM meridians, as opposed to the zigzag motion observed in traditional Chinese meridians, may enhance the efficacy of treatment by targeting specific physiological pathways implicated in glucose metabolism.

(iii) Limitations: Despite the promising findings, several limitations should be acknowledged. Firstly, the sample size of the study was relatively small, which may limit the generalizability of the results. Future studies with larger sample sizes are needed to validate the efficacy of Ayurvedic acupressure across diverse populations. Secondly, the study design did not include a long-term follow-up to assess the sustainability of the observed improvements in blood glucose levels. Longitudinal studies are necessary to evaluate the long-term effects of Ayurvedic acupressure on glucose metabolism and overall health outcomes. Additionally, the lack of blinding and randomization in the allocation of participants to treatment groups may introduce bias and confound the results.

(iv) Future Research Directions: Despite these limitations, the present study provides a foundation for future research investigating the therapeutic potential of Ayurvedic acupressure in managing blood glucose dysfunctionality. Future studies should employ rigorous research designs, including randomized controlled trials with larger sample sizes and long-term follow-up periods. Furthermore, elucidating the underlying mechanisms of action through physiological and biochemical analyses will enhance our understanding of how Ayurvedic acupressure influences glucose metabolism and related pathways. In conclusion, the findings of this study suggest that Ayurvedic acupressure may offer a promising adjunctive therapy for individuals with blood glucose dysfunctionality. By stimulating specific acupoints along the YNM meridians, Ayurvedic acupressure

may help restore balance and promote optimal health outcomes. However, further research is warranted to validate these findings and elucidate the mechanisms underlying the therapeutic effects of Ayurvedic acupressure.

Conclusion:

The findings of this study provide evidence supporting the effectiveness of Ayurvedic acupressure as a complementary therapy for blood glucose management. The significant reduction in fasting blood glucose levels observed in the acupressure group underscores the potential of this holistic approach in improving health outcomes for individuals with blood glucose dysfunctionality. Further research is warranted to explore the long-term effects and mechanisms underlying the therapeutic benefits of Ayurvedic acupressure.

Fundings of the research:

In this research the funding for the study was entirely self-funded by the researcher. As such, the financial resources necessary for conducting the research, including participant recruitment, data collection, laboratory analyses, and any other associated expenses, were provided by the researcher themselves, without external financial support from grants, institutions, or organizations. Self-funding a research project involves a significant commitment of personal resources, both in terms of time and finances. The researcher bears the full responsibility for covering all expenses related to the study, which can include but are not limited to:
1. Participant Recruitment: This may involve advertising for participants, screening individuals for eligibility criteria, and compensating participants for their time and involvement in the study.
2. Data Collection: The researcher may need to purchase equipment, materials, or software necessary for data collection, such as glucose monitoring devices, medical supplies, or data management tools.
3. Laboratory Analyses: If laboratory tests or analyses are required for the study, the researcher may need to cover the costs of sample processing, testing kits, reagents, and laboratory personnel fees.
4. Statistical Analysis: Statistical software, consultation fees for statisticians, and other expenses related to data analysis may also be self-funded by the researcher.
5. Publication Fees: Once the research is completed, there may be costs associated with publishing the findings in a peer-reviewed journal, including article processing charges (APCs) or open-access fees. Self-funding research provides the researcher with autonomy and flexibility in designing and executing the study according to their vision and research interests. However, it also requires careful budgeting and allocation of resources to ensure that the study can be conducted effectively and ethically. Despite the challenges associated with self-funding, it can be a viable option for researchers, particularly those who are passionate about their research topic and willing to invest their own resources to advance scientific knowledge and contribute to their field. By self-funding their research, the researcher demonstrates a strong commitment to their work and a dedication to the pursuit of knowledge, even in the absence of external financial support.

Availability of Byol- Magnets, Surgical Tape, and Protocol Chart:

In the context of this research study, the availability of byol magnets, surgical tape, and a readily accessible protocol chart are crucial components for ensuring the quality and authenticity of the treatment protocol. It is important to note that the mention of specific sources for obtaining these materials is solely for the purpose of authentication and facilitating the replication of the study's protocol, rather than for any promotional or commercial intent. Additionally, the researcher does not receive any promotional benefits or incentives from any institution or online site mentioned herein. Magnets, surgical tape, and the protocol chart can be obtained from various sources to ensure their accessibility for researchers and healthcare professionals interested in replicating or implementing the study's treatment protocol. These materials play essential roles in the administration and documentation of the intervention, contributing to the overall rigor and reliability of the research findings.

1. Byol- Magnets:

Byol-Magnets are utilized as part of the acupressure intervention in the study. They can be procured from various online sites specializing in medical supplies or therapeutic devices. Additionally, researchers and therapists may arrange for the acquisition of magnets through ASPEUS Prayagraj Centre in India. The availability of magnets is crucial for ensuring standardization and consistency in the acupressure treatment administered to participants.

2. Surgical Tape:

Surgical tape serves as a practical and non-invasive means of securing the magnets in place during the acupressure intervention sessions. It is essential for maintaining the correct positioning and pressure on the acupressure points. Similar to magnets, surgical tape can be sourced from online suppliers or obtained through ASPEUS Prayagraj Centre. The accessibility of surgical tape ensures the smooth implementation of the treatment protocol and enhances the reproducibility of the study's results.

3. Protocol Chart

A readily available protocol chart outlines the specific acupressure points targeted during the intervention, along with corresponding instructions for application. This chart serves as a valuable reference tool for therapists and ensures consistency in the administration of the treatment across different sessions and participants. The protocol chart may be accessed electronically via email to the author for online consultation or obtained directly from ASPEUS Prayagraj Centre in India. By providing easy access to the protocol chart, researchers aim to facilitate the dissemination and adoption of the treatment protocol within the scientific community and healthcare settings. In summary, the availability of magnets, surgical tape, and a readily accessible protocol chart is essential for maintaining the authenticity, quality, and reproducibility of the treatment protocol outlined in the research study. Mention of specific sources for obtaining these materials is intended to enhance the transparency and accessibility of the study's methodology, without any promotional intent or benefit to the author. Researchers and healthcare professionals are encouraged to utilize these resources for the betterment of scientific inquiry and the advancement of healthcare practices for the benefit of society.

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