World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

FOOT REFLEXOLOGY AS A SUPPORTIVE THERAPY FOR DIABETES- A COMPARATIVE ANALYSIS OF BLOOD GLUCOSE LEVELS USING VARAM REFLEXO-STUMP FOOTWEAR

[1]*Dr. Prof. M. Vijay Anand MDS D. Acu, [2]*Dr. G. Sameeruddin Ahamed BDS D. Acu, [3]*Dr. J. Roshini BDS D. Acu, *Dr. N. Naveen Raj BDS D. Acu.

Professor, Dr. M.G.R Educational and Research Institute, Periyar E.V.R High Road, Viswasa Nagar, Maduravoyal, Chennai-600 095.

***Corresponding Author: Dr. Prof. M. Vijay Anand**

Professor, Dr. M.G.R Educational and Research Institute, Periyar E.V.R High Road, Viswasa Nagar, Maduravoyal, Chennai-600 095.

Article Received on 21/12/2019 **Article Revised on 11/01/2020** **Article Accepted on 01/02/2020**

ABSTRACT

Background: Reflexology, an ancient practice over the years well-known as a key therapeutic element involves applying pressure at specific points for treating many ailments in the human system. Most of these reflex points are found in the hands and feet. Foot reflexology in recent days has proven to be effective against endocrine and metabolic diseases specifically in controlling blood sugar levels. **Aim:** To reduce blood glucose levels using Varam-reflexology stump footwear as a supportive therapy. **Objective:** To evaluate the random blood glucose level using reflexology stump footwear in different time intervals. **Material and Methods:** The present observational comparative study was conducted onrandomly selected 9 (Nine) diabetic patients. Random blood sugar levels were noted at the time of visit examined by categorizing them into three groups A, B, C by usage of footwear at different intervals of 15, 30 and 60mins respectively. After the waiting period of 30, 60 and 90mins correspondingly final random blood sugar levels were recorded. Chi-square test, Wilcoxon Signed-Rank test analyzes were applied to the data, considering a significance level of 1% (P value <0.01). **Results:** Random blood glucose level recorded initially revealed mean value of 229.33mg/dl with S.D of 76.478 mg/dl and S.E of 25.49. After therapy the mean random blood glucose level was observed to be 185.77g/dl with S.D of 77.56 mg/dl and S.E of 25.85 in relation to different time intervals. Statistical difference was observed with f-ratio value of 24.93842 and p-value is < .00001($p < .01$*) when comparative analysis was performed between the three groups. Wilcoxon Signed-Rank test showed mean difference of 123.33 with significance at $p<0.01$. **Conclusion:** Based on the results of this comparative study, either as supportive therapy to conventional treatment or as first-line therapy, foot reflexology by using Varam-reflexology stump footwear can contribute in improving the scores of blood sugar level among diabetic individuals.

KEYWORDS: Diabetes, Foot reflexology, Natural Therapy, Random Blood sugar, Target regions.

INTODUCTION

Diabetic is considered as endemic disease with highest incidence of new patients every year caused due to improper glucose or carbohydrate metabolism.[1] According to World Health Organization (WHO) there are about 150 million diabetic patients throughout the world. It is estimated that around 2025 this number will reach more than 300 million.[2] The effects of diabetes can lead to disturbances in the blood circulation, occurrence of foot ulcers with potential amputations. Further complications can cause heart disease, kidney related diseases and blindness. There are many known methods to prevent or control diabetes. One popular method with unanticipated results is foot reflexology.[3,4]

Reflexology is the science of studying the human health through certain specific reflex/reflexology areas (RAs) quantized on feet, hands, and ears.[5] Modern reflexology involves applying pressure, is the ancient form of foot and hand therapy being practiced in china as long ago as 2330 B.C.[6] Recently attainment popularity this treatment is very effective and essential for physical and emotional cures owing to its specific impact. Most of these reflex points are found in the hands and feet. These zones are the holograms on the entire body. Hence by stimulating these reflex points on the hands and feet one can observe its beneficial effect on all the organ system.[7] Better functioning of the kidney, improvement in blood flow and relaxing the body from stress and the day's fatigue, reduction of pain especially in joints and controlling blood sugar are the most common beneficial

effects observed. It was noted that due to variation in insulin production and elevated blood sugar levels, points focusing on endocrine metabolism are found to be beneficial.[8] Studies were carried out over the years to establish the correlation between foot reflexology and its effect on diabetes. Application of regular pressure on the target organs responsible for carbohydrate metabolism will assist in normalizing blood sugar levels.Organs involved in carbohydrate metabolism are pancreas, small intestine, liver. Applying regular pressure in these targeted areas in the foot gives the promising results in controlling diabetesby increasing the insulin secretion mechanism.[9,10] The most important demographic change to diabetes prevalence across the world appears to beincreased in the proportion of people between 40-65 years of age.[11] Hence the present observational study was undertaken among these age group individuals to evaluate and compare random blood glucose level using Varam-reflexologystump footwear in different time intervals.

MATERIAL AND METHODS

The present observational comparative study was conducted on randomly selected 9 (Nine) diabetic patients. Random blood sugar level was noted at the time of visit taken as initial RBS (Random blood sugar) examined by categorizing them into three groups A, B, C by usage of footwear at different intervals of 15, 30 and 60mins respectively followed by waiting phase of 30, 60 and 90mins among the three groups as follows.

GROUP A- 3 Diabetic patients –instructed to wear Varam-reflexology stump footwear for 15mins followed by waiting period of 30mins.

GROUP B-3 Diabetic patients – instructed to wear Varam-reflexology stump footwear for 30mins followed by waiting period of 60mins.

GROUP C-3 Diabetic patients – instructed to wear Varam-reflexology stump footwear for 60mins followed by waiting period of 90mins.

During the observational period patients were advised not to consume any solid or liquid intakes. After the waiting period of 30, 60 and 90mins correspondingly final random blood sugar levels (Final RBS) (Figure 1) were recorded. Standard parameters including blood pressure, pulse and oxygen saturation were noted to evaluate the vital signs status at the time of observation (Figure 2). All the data obtained were recorded (Table 1) and evaluated for statistical analysis using the Statistical Package for the Social Sciences (SPSS) version 26.0 software for Windows, Chicago, IL, USA.

Statistical Analysis: Chi-square test, Wilcoxon Signed-Rank test analyzes were applied to the data considering a significance level of 1% (P value <0.01).

RESULTS

Descriptive analysis of data presented the mean age of the study group as 57.8 years with S.E of 3.73 and S.D of 11.2 years. Random blood glucose level recorded initially revealed mean value of 229.33mg/dl with S.D of 76.478 mg/dl and S.E of 25.49. After therapy the mean random blood glucose level was observed to be 185.77g/dl with S.D of 77.56 mg/dl and S.E of 25.85 in relation to different time intervals.

Correlation between the groups was calculated by using Chi-square test and Wilcoxon Signed-Rank test. No statistical significance was observed in either of the group A (p=0.81064), B (p=0.95644) or C (p=0.5882) when chi square test was performed to evaluate interrelationship within the groups with same time intervals. Chisquare test performed to evaluate the correlation between the three groups showed f-ratio value of 24.93842. The p-value is < .00001. The result is significant at $p < .01$. (Table 2) with mean value of 229.33mg/dl before therapy and 185.77mg/dl following therapy with difference in mean of about 43.55mg/dl with S.D of 29.10 mg/dl. The results were significant at mean usage time of 35minutes followed by waiting period of 60minutes with standard deviation of 19.8 and 25.9 minutes respectively (Graph 1). Wilcoxon Signed-Rank Test Calculation used for assumption of normality revealed mean difference in blood sugar value among all the groups as 123.33mg/dl. The value of W is 0. The critical value for W at $N = 9$ ($p < .01$) is 1 with a high significance of $p<0.01$(Table 3)

Table 1: Table showing the random blood sugar values recorded before and after using Varam-reflexology stump footwear.

S. no.	Age/ Gender	Blood glucose initial reading (mg/dl) Random	Reflexo-stump Footwear using time In minutes	Waiting period after removing footwear in Minutes	Blood glucose final reading (mg/dl)	Blood glucose reading Difference (mg/dl) Random	Bp(sys/dia) Pulse Spo2 Initial reading	Bp(sys/dia) Pulse/spo2 Final reading
1.	60/F	253	15	30	238	**15**	167/117 104/97	136/102 97/98
2.	61/M	121	15	30	106	**15**	125/85 88/98	120/75 85/99

3.	44/M	142	15	30	122	**20**	122/84 98/85	121/79 82/98
4.	43/M	304	30	60	269	**35**	145/91 85/99	128/82 82/98
5.	67/M	306	30	60	275	**31**	130/82 91/97	125/75 88/96
6.	44/F	310	30	60	269	**41**	124/82 97/90	120/75 79/95
7.	72/F	281	60	90	183	**98**	126/65 107/96	124/78 90/98
8.	65/M	175	60	90	98	**77**	133/84 90/98	125/78 85/97
9.	65/F	172	60	90	112	**60**	148/92 85/98	131/86 81/99
10.	60/F	253	15	30	238	**15**	167/117 104/97	136/102 97/98

Table 2: Table showing chi square test performed to evaluate the correlation between the three groups.

	Initial RBS	**Usage Period**	**Waiting Period**	**Final RBS**
N	9	9	9	9
∑X	2064	315	540	1672
Mean	**229.3333**	35	60	**185.7778**
∑X2	520136	14175	37800	358748
Std.Dev.	**76.4788**	19.8431	25.9808	**77.5625**
Between-Groups	241909.4167	3	80636.4722	**F = 24.93842**
Within-Groups	103469.5556	32	3233.4236	
Total	345378.9722	35		

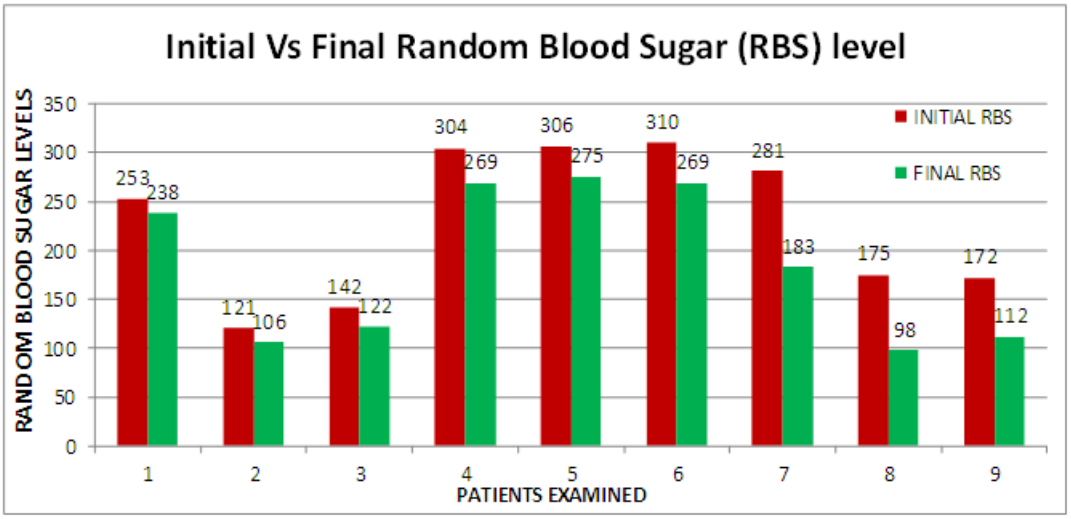
The f-ratio value is 24.93842. The p-value is < .00001. The result is significant at p < .01.

Table 3: Table showing the Wilcoxon Signed-Rank Test Calculation used for assumption of normality.

Wilcoxon Signed-Rank Test Calculator
W-value: 0
Mean Difference: 123.33
Sum of pos. ranks: 45
Sum of neg. ranks: 0
Z-value: -2.6656
Sample Size (N): 9
The value of W is 0. The critical value for W at N = 9 (p < .01) is 1. **The result is significant at p < .01.**

Figure 1: Figure showing the random blood glucose level recorded after using Varam reflexo-stump footwearand waiting observational period (Final RBS).

Figure 2: Figure showing thevital signs status at the time of observation.



Graph 1: Graph showing the random blood sugar levels before and after therapy at different time intervals among the study participants.

DISCUSSION

Diabetes according to reflexology can be controlled with the proper use of reflex points on feet. Certain area-specific reflex points found in the feet helps to remove the toxins and encourage healing.[12] In this study, by evaluating the effects of footreflexology on people with diabetesmellitus, it was noted that the therapy had significant effect among all the groups considering a significance level of 1% (Pvalue<0.01).Several researchers state that cutaneous stimulation can contribute for the balance of the body, either at physiological or metabolic level.[13] Accordingly, by exerting some pressure on the tissue surface, it is possible to trigger systemic reactions.[14]

A review from 2001, by Ezzo et al. noted that applying excessive pressure may present some risks if care is not taken properly. In people with neuropathy, the therapist should know the correct ways to apply pressure so as not to damage blood vessels and tissues.[15] It was also observed in people on insulin, massage may increase the risk of hypoglycemia (too low blood sugar).[16] Keeping all these factors into consideration Varam-reflexology stump footwear was designed with Stumps made with Polypropylene (which acts as the pressure spot that stimulates the targeted areas). Protective caps made with Low density Polypropylene to aid in protection of foot from damage and Velcro for holding foot to footwear acting as a supplemental aid in holding the foot wear in position.

Krishna Dalal et al in 2014 performed a 6 months follow up randomized control trial study to determine the efficacy of reflexology in managing patients with diabetic neuropathy. On completion of the trial, the clinical status observation showed that reflexology group patients responded with highly statistical significance.[17]

This is similar to the present study where all the three groups showed high significant result.

The present study showed correlation between the three groups ($P<0.01$) at different intervals of time similar to the study results obtained by randomized trial study performed by magalhaes da silva et al in 2015 at interval of 12 sessions over a period of 30 days with 3 therapy sessions a week to evaluate the effect of foot reflexology on feet impairment of people with type 2diabetes mellitus. It was also noticed no significant effect within the group of diabetic individuals who used foot wear at same time intervals than with those used at different time intervals similar to the above study, signifying the role of usage and resting period as an important contributing factor towards success of therapy.[18]

Martinez et al in 2018 performed a randomized, controlled and single-blind clinical trial performed at a diabetes educational center concluded that Functional capacity, role-physical, pain, role-emotional, and HAQ-DI (Index) scores were better in patients treated with reflexology, when compared with untreated patients.[19] The above study in assistancewith the present study evidences that reflexology can reduce stress and improve well-being, which has a secondary effect on blood glucose levels, and therefore may play a role in preventing complications.[20]

CONCLUSION

The study participants who received Varam-reflexology stump footwear therapy showed better improvement in the random blood sugar level scores by evaluating at three different time interval period. Accordingly, in this study, it was detected that reflex therapy exhibited some beneficial effect, making it a feasible practice that deserves investment. Aside from preventing or controlling incurable problem, these reflexology methods can improve the overall being of your health. Therefore, this study is desired to ensure and certify the application of Varam-reflexology stump footwear as a supportive tool in patients with diabetes, ensuring their use in treatment or therapeutic care.

REFERENCES

1. Bowering K, Embil JM. Foot care. Can J Diabetes, 2013; 37(5): 45-9.
2. V. Mohan, S. Sandeep, R. Deepa, B. Shah, and C. Varghese, “Epidemiology of type 2 diabetes: Indian scenario,” IndianJournal of Medical Research, 2007; 125(3): 217–230.
3. Ken koh. Foot Reflexology To Control, Reduce & Prevent Diabetes Foot Reflexology Diabetes, 2017. Available from: https://www.preciousfoot.com.sg.
4. Meyer C, Dostou JM, Welle SL, Gerich JE. Role of humanliver, kidney, and skeletal muscle in postprandial glucosehomeostasis. Am J Physiol Endocrinol Metab, 2002; 282: E419-E427.
5. J. Bliss and G. Bliss, “Theories on how reflexology works,” Reflections Assoc Reflexol J, 1999.
6. Health shield. The Benefits of Reflexology. J of Health & Well being Blogs. (21st September); Available from: https://www.healthshield.co.uk, 2017.
7. Jones J, Thomson P, Lauder W, Howie K, Leslie S. Reflexology has an acute immediate haemodynamic effect in healthy volunteers: A double-blind randomised controlled trial. Complement Ther Clinl Pract., 2012; 30(1): 1-8.
8. Ozdemir G, Ovayolu N, Ovayolu O. The effect of reflexology applied on haemodialysis patients with fatigue, pain and cramps. Int J Nurs Pract, 2013; 19(1): 265-73.
9. Ernst E, Posadzki L. Reflexology: an update of a systematic review of randomized clinical trials. Maturitas, 2011; 68(2): 116-20.
10. K. Kunz and B. Kunz, The Complete Guide to Foot Reflexology (Revised) Reflexology Research Project, D, Albuquerque, NM, USA, 1993.
11. S. Wild, G. Roglic, A. Green, R. Sicree, and H. King, “Global Prevalence of Diabetes: estimates for the year 2000 and projectionsfor 2030,” Diabetes Care, 2004; 27(5): 1047–1053.
12. H. Hodgson, “Does reflexology impact on cancer patients’quality of life?” Nursing Standard, 2000; 14(31): 33–38.
13. Nurul Haswani Embong, Yeechang Soh, Long Chiau Ming, Tinwui Wong. Revisiting Reflexology-Concept, Evidence, Current, Practice and Training, J of Traditional and Complementary Medicine, 2015; 1-10. Available from: https://www.elsevier.com /locate/jtcme.
14. Sungkuk Chun, Sejin Kong, Kyung-Royal Mun, Jinwook Kim. A Foot Arch Parameter Measurement System Using a RGB-D Camera, Sensors, 2017; 17: 179. doi:10.3390/s17081796; Available from: https://www.mdpi.com/journal/sensors.
15. Ezzo J, Donner T, Nickols D, et al. Is massage useful in the management of diabetes: a systematic review? 2001. In: Database of Abstracts of Reviews of Effects (DARE): Quality-assessed Reviews [Internet]. York (UK): Centre for Reviews and Dissemination (UK); 1995-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK68486/.
16. Kawahito S, Kitahata H, Oshita S. Problems associated with glucose toxicity: Role of hyperglycemia-induced oxidative stress. World J Gastroenterol, 2009; 15(33): 4137-4142.
17. Krishna Dalal, V. BharathiMaran, Ravindra M. Pandeyand Manjari Tripathi. Determination of Efficacy of Reflexology in ManagingPatients with Diabetic Neuropathy: A Randomized Controlled Clinical Trial, 2014. Article ID 843036, 11 pages.http://dx.doi.org/10.1155/2014/843036
18. Natália Chantal Magalhães da Silva, Érika de Cássia Lopes Chaves. Foot reflexology in feet impairment of people with type 2 diabetes mellitus: randomized

trial. Rev. Latino-Am. Enfermagem, 2015; 23(4): 603-10.
19. Martinez B.B, Simoes R.A, Machado G.V. Reflexology And Quality Of Life In Diabetic Patients: Randomized Clinical Trial. IJAR, 2018; 8(1): 257-259.
20. Anand.V, Charan.S.K, Ahamed.S, Raj.N. A Comparative Evaluation Of Fasting Blood Glucose Level In A Diabetic Patient After Using Varam - Reflexo Stump Footwear As A Natural Therapy- A Clinical Study. WJPLS, 2020; 6(1): 187-190.