

EFFECT OF NATUROPATHIC COLD COMPRESS ON PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Abstract: Cold compress is a treatment of choice in hydrotherapy in the management of Type 2 Diabetes Mellitus. Hence the present study evaluated the effect of cold compress on blood glucose and Glycated hemoglobin levels in Type 2 Diabetes Mellitus patients. 90 patients were recruited for the study, based on the inclusion and exclusion criteria. They were assigned to the naturopathy, control and interventional groups. Subjects were assessed for FBS, PPBS and HbA1C levels on the first day of their admission, FBS and PPBS are again collected on the 10th day and patients are asked to send the HbA1C reports immediately after 3 months of follow-up. The results suggested that experimental group have significantly reduced levels of FBS, PPBS along with HbA1C compared to naturopathy and control group and, naturopathy group has shown more beneficial results compared to control group. Thus, addition of cold compress with Naturopathy treatments, Diet and Yoga augments the therapeutic effects of Yoga & Naturopathy interventions in the management of Type 2 Diabetes Mellitus.

Index Terms: Diabetes type 2; Glycosylated Hemoglobin HbA1C; Fasting blood sugar; Post prandial blood sugar.

INTRODUCTION

Diabetes mellitus is a nutritional disorder, characterized by an abnormally elevated level of blood glucose and by the excretion of the excess glucose in urine. It results from an absolute or relative lack of insulin which leads to abnormalities in carbohydrate metabolism as well as in the metabolism of protein and fat.¹ The disease burden related to diabetes is high and rising in every country, fuelled by the global rise in the prevalence of obesity and unhealthy lifestyles.² The World Health Organization (WHO) estimated that there were 135 million diabetic individuals in the year 1995 and it has been projected that this number will increase to 300 million by the year 2025.³ Developing countries have major part of diabetics and second largest number of diabetics are present in India.⁴ India is considered to be the second largest country with >61 million of diabetics in the world.⁵

Diabetes mellitus is associated with retinopathy, nephropathy, neuropathy, neurogenic bladder, recurrent infections and metabolic complications.⁶ The leading cause of morbidity and mortality are cardiovascular complications among patients with NIDDM. The cardiovascular disease risk is higher in the diabetic population compared to non-diabetic individuals of a similar age, sex and ethnicity.^{7,8} Chronic diabetics also have decreased β cell activity which results in decreased pancreatic function.⁹ Management concentrates on a well-balanced, nutritious diet which is a fundamental element of therapy for diabetes. In prescribing a diet, it is important to relate dietary objectives to the type of diabetes.⁹ Lifestyle modification has positive impact on type 2 diabetes mellitus.¹⁰ New research suggests that exposing adults with Type 2 Diabetes to cold temperatures boosts insulin metabolism better than long-term changes to diet and exercise.¹¹

Naturopathy treatment may reduce risk for NIDDM, including improved glucose control.¹² Hydrotherapy is one of the important therapies of Naturopathy, which has been proven beneficial in many systemic disorders including neonatal growth.¹³⁻¹⁶

Compress is simply the application of water at any temperature by means of a cloth, a sponge, or other suitable medium. A linen cloth of two to four thickness and of proper size, or cheese cloth doubled four to eight thickness, renders the best service. The temperature to be employed is 55 degrees to 70 degrees. The lower temperature is greatly preferable, because of the decided effects upon the arterial trunks.¹⁷ After the first onset, the cold compress is changed every 20 to 30 min, is most useful. The compress should always cover an area larger than the part to be influenced. Cool compress may be employed in such a manner as to influence the circulation and the functions of liver, spleen, stomach, kidneys, intestines, lungs, brain, pelvic viscera-in fact all the internal structures of the body.¹⁷

METHODOLOGY:

Subjects:

A total of 90 patients were selected for the study, out of which 60 patients (30 intervention, 30 naturopathy) were those who got admitted in Shanthivana for a period of 10 days. 30 patients (control group) were people who are residing in Ujire. The selected patients should satisfy the inclusion criteria i.e., age must be 35-60 years, both males and females were included and patients who were diagnosed as subjects of type 2 diabetes mellitus who are under medication. Exclusion criteria includes patients with uncontrolled diabetes and patients with other systematic complications. The subjects were instructed about the study and all subjects who are willing to take part in the study were considered. A signed informed consent was obtained from each individual. Institutional Ethical Committee approved the study.

Study design:

The study adopts randomized control trial design. The subjects were randomly divided into 3 groups, the cold compress group (30), naturopathy group (30), and control group (30) subjects. The subjects were assessed on day 1 for FBS, PPBS and HbA1c,

and on day 10 for FBS, PPBS and after 3 months for HbA1C alone during which naturopathy group received prescription for yoga and diet, whereas intervention group received prescription for yoga, diet, naturopathy treatments, including cold compress.

Statistical Analysis:

Data were analyzed using IBM SPSS 21.0. The data was checked for normality and an ANOVA test was employed to compare the means between the three groups. For all the analysis, we present 95% confidence intervals and considered $p < 0.05$ as significant.

RESULTS

Results of the present study indicates significant improvement in FBS, PPBS and HbA1c in subjects of intervention and naturopathy group following treatment ($p=0.0001$). Compared to naturopathy group more significant results were seen in intervention group. There were no significant results observed in the control group. Results suggested significant role of cold compress in controlling type 2 diabetes.

Table: 1 comparison of three study groups with respect to pretest and posttest FBS scores by one way ANOVA

Groups	Pretest		Posttest		Difference	
	Mean	SD	Mean	SD	Mean	SD
Intervention Group	167.53	48.22	124.00	30.94	43.53	34.43
Naturopathy Group	167.97	37.62	143.87	35.29	24.10	20.14
Control Group	166.30	23.31	157.33	19.97	8.97	10.10
% of Changes In Intervention Group					25.98%#, $P=0.0001^*$	
% of Changes In Naturopathy Group					14.35%#, $P=0.0001^*$	
% of Changes In Control Group					5.39%#, $P=0.0010^*$	
F-Value	0.0157		9.7289		15.9628	
P-Value	0.9844		0.0002*		0.0001*	
Pair wise comparisons by Tukeys multiple post hoc procedures						
Intervention Vs Naturopathy	P=0.9990		P=0.0283*		P=0.0060*	
Intervention Vs Control	P=0.9913		P=0.0002*		P=0.0001*	
Naturopathy Vs Control	P=0.9841		P=0.1854		P=0.0409*	

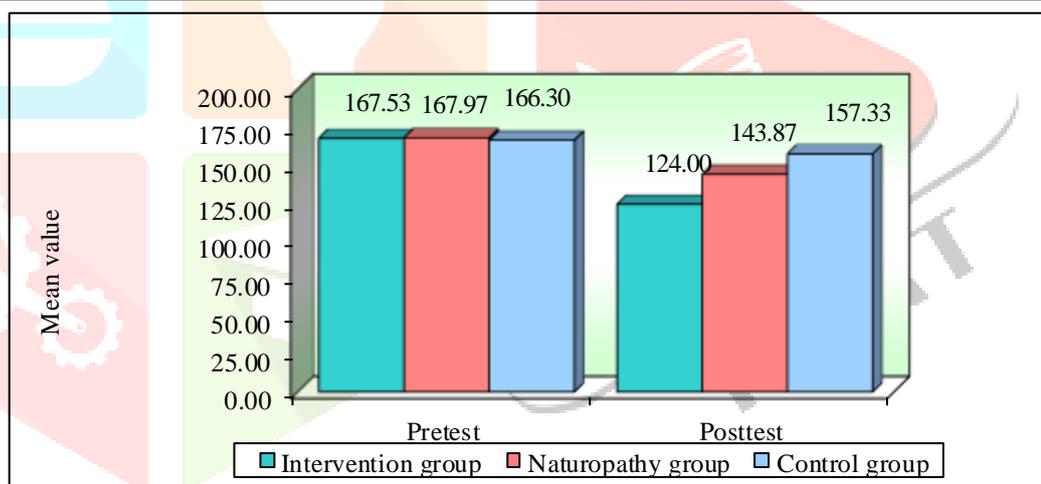


Figure: 1 comparison of three study groups with respect to pre-test and post-test FBS scores

Table: 2 comparison of three study groups with respect to pre-test and post-test PPBS scores by one way ANOVA

Groups	Pretest		Posttest		Difference	
	Mean	SD	Mean	SD	Mean	SD
Intervention group	209.93	60.67	156.80	38.75	53.13	43.08
Naturopathy group	206.17	66.88	174.37	49.87	31.80	27.11
Control group	199.43	49.46	192.40	51.78	7.03	8.58
% of changes in intervention group					25.31%#, $p=0.0001^*$	
% of changes in naturopathy group					15.42%#, $p=0.0001^*$	
% of changes in control group					3.53%#, $p=0.0010^*$	
F-value	0.2402		4.2756		17.9828	
P-value	0.7870		0.0169*		0.0001*	
Pair wise comparisons by Tukeys multiple post hoc procedures						
Intervention vs naturopathy	P=0.9674		P=0.3237		P=0.0186*	
Intervention vs control	P=0.7734		P=0.0122*		P=0.0001*	
Naturopathy vs control	P=0.8995		P=0.3050		P=0.0052*	

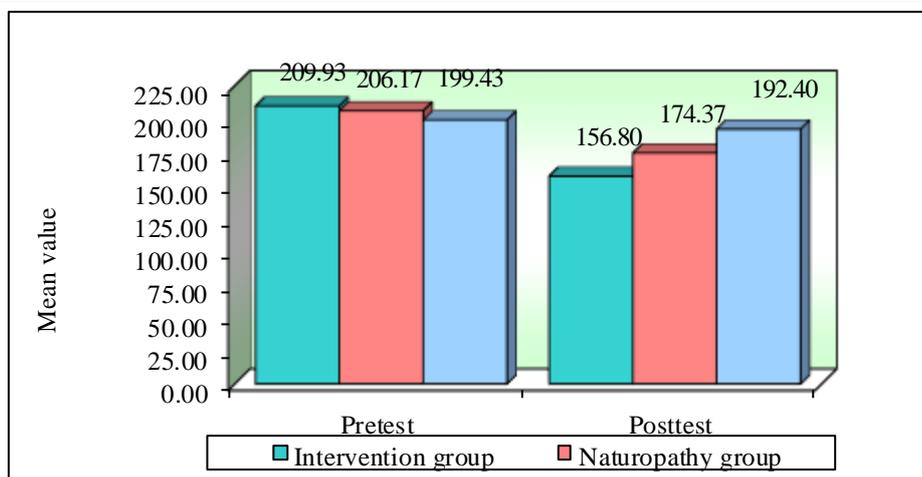


Figure:2 comparison of three study groups with respect to pretest and posttest PPBS scores

Table: 3 comparison of three study groups with respect to pretest and posttest HbA1c scores by one way ANOVA

Groups	Pretest		Posttest		Difference	
	Mean	SD	Mean	SD	Mean	SD
Intervention group	8.27	1.67	6.95	1.68	1.32	0.83
Naturopathy group	8.24	1.71	7.74	1.87	0.49	0.63
Control group	7.86	0.91	7.84	0.91	0.02	0.44
% Of changes in intervention group					15.97%#, p=0.0001*	
% Of changes in naturopathy group					5.99%#, p=0.0010*	
% Of changes in control group					0.25%#, p=0.8057	
F-value	0.7041		3.0263		30.2797	
P-value	0.4973		0.0536		0.0001*	
Pair wise comparisons by Tukeys multiple posthoc procedures						
Intervention vs naturopathy	P=0.9967		P=0.1186		P=0.0001*	
Intervention vs control	P=0.5385		P=0.0700		P=0.0001*	
Naturopathy vs control	P=0.5876		P=0.9682		P=0.0173*	

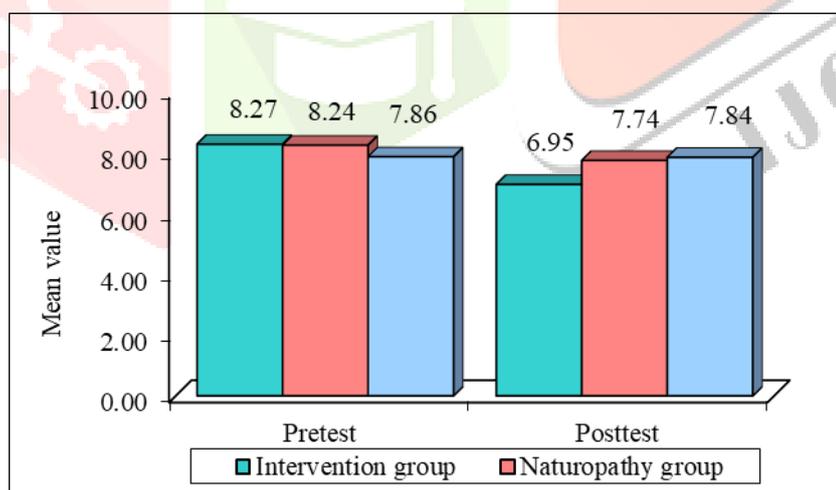


Figure: 3 comparison of three study groups with respect to pre-test and post-test HbA1c scores

DISCUSSION

The study results shows that FBS has significantly reduced in intervention and naturopathy groups, but the reduction was more in intervention group compared to naturopathy group. Whereas no such significant change is noticed in the control group; PPBS and HbA1c also showed significant reduction in both intervention and naturopathy groups, (reduction was more in intervention group than in naturopathy group) and again there was no significant change noticed in the control group. These results shows that the addition of cold compress in Yoga & Naturopathic intervention facilitates better clinical outcomes in the management of type 2 diabetes mellitus.

Previous studies have shown decrease in blood glucose levels by Yoga, Diet and Naturopathic interventions. Changes like increased self-monitoring of blood glucose, improved diet, increased physical activity, enhanced self-efficacy, improved mood and reduced problem areas in diabetes were noticed.¹⁶ Another study demonstrates that reduction in the risk factors were noticed

with long term naturopathic care for T2DM with notable percentages of improvements in glucose levels as measured by HbA1C levels.¹⁸

A previous study states that lifestyle intervention was effective as insulin treatment in improving glycemic control in poorly controlled subjects with type 2 diabetes, and resulted in weight loss during the interventional year.¹⁹ Another study states that INY, adjunctive to pharmacotherapy, was associated with a significant beneficial effect on glycemic control and reduced the need for antidiabetic medication.²⁰

A study has shown that a naturopathic dietary approach to diabetes appears to be feasible to implement among T2DM patients. The intervention may also improve self-management, glycemic control, and have influences in other domains of self-care behaviors. HbA1c improved by an average of 0.5%, which is clinically meaningful.²¹

It is known that the local application of cold induces alterations in thermogenesis mechanisms, leading to increased metabolic rate.²² Hot tub therapy²³ and warm water immersion²⁴ were reported to reduce weight, glucose level, and glycosylated hemoglobin; reduction in heart rate, and increase in systolic and diastolic biventricular functions, respectively. Stress reducing the effect of massage might attribute to control counter regulatory stress hormones and permitting the body to use insulin more effectively.²³

Momordicacharantia (bitter gourd) and *Trigonellafoenum-graecum* (fenugreek) were reported to have antidiabetic and lipid lowering effect. The possible mechanisms could be through repairing damaged β -cells, stimulating insulin secretion and sensitivity/signaling, inhibiting absorption of glucose by inhibiting glucosidase and suppressing the activity of disaccharides in intestine, and decreasing adipose tissues²⁵ thereby reduces pro inflammatory cytokines.²⁶

A study suggests that INYT with insulin and anti-hypertensive medication can be considered as effective treatment modalities in a patient with MS (metabolic syndrome).it helps in reducing the abnormal or elevated levels of weight, body mass index, waist circumference (WC), FBG, PPBG, SBP, DBP, and lipid profile which are the major characteristics of MS.²⁰

One more study states that there are several treatment modalities to control blood sugar levels, many of which have sideeffects.In this study, intensive naturopathy and yoga, given as first-line treatment for T2D before commencement of any other treatments, demonstrated significant clinical benefits for glucose control, and without apparent side effects.²⁶ Another study states that cold hipbath is very beneficial for diabetes.It reduces obesity, helps organs of elimination to function properly and relieves constipation and indigestion.²⁷

We speculate that cold compress application on lower abdomen in this study, could also be an additional factor in enhancing metabolism, mediated through thermoregulatory changes. The present results suggest that the cold compress given to T2DM patient's decreases FBS, PPBS and HbA1c. While the underlying mechanism of the clinical benefits of cold compress remains to be studied, this particular finding is a worthwhile lead in future explorations. Strengths of the study are it is a randomized study, no dropouts, Cost effective, no documented effects in any of the groups, no life threatening serious complications. Limitations of the study are compared to other intervention based studies this study is of short duration, so clinical benefits were not seen, smaller sample size, guidance was given during follow-up period of the study through phone calls, but personal observation was not given.

CONCLUSION

The present study suggested that cold compress along with naturopathy treatments, Yoga and diet therapy prescription has reduced significantly the levels of FBS, PPBS along with HbA1c. The naturopathy group which received naturopathy treatments, Yoga and diet excluding cold compress also showed reduction in FBS, PPBS and HbA1c levels but not in higher levels compared to intervention group. There was no reduction in values of FBS, PPBS and HbA1c of control group. Adding cold compress along with naturopathy treatments, diet and yoga augments the effects in Type 2 Diabetes. Hence cold compress can be considered as an adjuvant therapy in the treatment of Type 2 Diabetes mellitus along with naturopathy treatments.

ACKNOWLEDGEMENT

I thank Dr.Prashanth Shetty, Principal of the Institution, Dr. Sujatha my honorable Dean, and hospital staff and my parents for their continuous support and encouragement.

REFERENCES

1. Bakhru, HK. 1991. A complete hand book of nature cure. Mumbai; Jaico, 351-356.
2. Nita Gandhi, Forouhi. and Nicholas, J Wareham. 2014. Epidemiology of diabetes. *Medicine (Abingdon)*, 42(12):698-702.
3. Iyer, SR. 2003. Type 2 diabetes express highway, where is the 'U' turn? . *J Assoc Physicians India*, 51:495-500.
4. Arora, M.M., Chander, Y. and Rai R. 2000. Diabetes Mellitus in India Y2K not ok. *Medical Journal Armed forces India* , LVI:1-2.
5. International Diabetes Federation. 2011. *Diabetes Atlas*. 5th edition. Brussels, Belgium, International Diabetes Federation.
6. Davidson, MB. 1991. *Diabetes mellitus; diagnosis and treatment*. 3rd ed. New York, NY: Churchill living stone.
7. Ramachandran, A., Snehalatha, C., Kapur, A., Vijay, V., Mohan, V. and A.K, Das. 2001. High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey. *Diabetologia*, XLIV:1094-101.

8. Menon, V.U., Kumar, K.V., Gilchrist, A., Sugathan, T.N., Sundaram, K.R., and Nair, V. 2006. Prevalence of known and undetected diabetes and associated risk factors in central Kerala ADEPS. *Diabetes Res Clin Pract*, LXXVII:289-94.
9. Greenspan, S.F., and Gardner, D.G. 2011. *Basic and Clinical Endocrinology*. McGraw-Hill Medical: China, 691.
10. Shanley, Chong., Ding, Ding., Roy Byun., Elizabeth, Comeno., Adrian, Bauman. and Bin, Jalaludin. 2017. Lifestyle changes after a diagnosis of type 2 diabetes. *Diabetes Spectr*, 30(1):43-50.
11. Fiona, Wong. 2015. Cold Exposure as a Potential Therapy for Type 2 Diabetes. *Medical News Bulletin*. August 17.
12. Blazickova, S., Rovensky, J., Koska, J. and Vigas, M. 2000. Effect of hyperthermic water bath on parameters on cellular immunity. *Int J Clin Pharmacol Res*, 20(1-2):41-6.
13. Robiner, W.N. 1990. Psychological & physical reactions to whirlpool baths. *J Behav Med*, 13(12):157-73 20.
14. Zhao, S., Xie, L., Hu, H., Xia, J., Zhang, W., Ye, N. and Chen, B. 2005. A study of neonatal swimming (water therapy) applied in clinical obstetrics. *J Matern Fetal Neonatal Med*, 17(1):59-62. 21.
15. Scott Nadler, F., Kurt, Weingand., Roger Kruse, J. 2004. *The Physiologic Basis and Clinical Applications of Cryotherapy and Thermotherapy for the Pain Practitioner*. *Pain Physician*, (7):395-99.
16. Ryan, Bradley., Karen J, Sherman., Sheryl, Catz., Carlo, Calabrese., Erica B, Oberg., Luesa, Jordan., Lou, Grothaus. and Dan, Cherkin. 2012. Adjunctive naturopathic care for type-2 diabetes: patient reported and clinical outcomes after one year. *BMC Complementary and Alternative Medicine*, 12:44.
17. Kellog, JH. *Rational Hydrotherapy*. 2005. Pune: National Institute of Naturopathy, 771-781.
18. Arkady, Leokum. 1994. *Tell me why*. Putnam and grosset Group. Newyork.
19. Aas, AM., Bergstad, I., Thorsby, PM., Johannesen, Ø., Solberg, M. and Birkeland, KI. 2005. An intensified lifestyle intervention programme may be superior to insulin treatment in poorly controlled Type 2 diabetic patients on oral hypoglycaemic agents: results of a feasibility study. *Diabetic medicine*, 22(3):316-22.
20. Mooventhan, A. and Shetty, GB. 2015. Effect of integrative naturopathy and yoga therapies in patient with metabolic syndrome. *International Journal of Health & Allied Sciences*, 4(4):263.
21. Oberg, EB. 2011. CAM: Naturopathic dietary interventions for patients with Type 2 diabetes. *Complement Ther Clin Pract*, 17(3):157-161.
22. Arthur, Guyton. and John, Hall. 2006. *Textbook of Medical Physiology*. Elsevier Inc.
23. Pandey, A., Tripathi, P., Pandey, R., Srivatava, R. and Go swami, S. 2011. Alternative therapies useful in the management of diabetes: A systematic review. *J Pharm Bioallied Sci*, 3:504-12.
24. Mooventhan, A. and Nivethitha, L. 2014. Scientific evidence-based effects of hydrotherapy on various systems of the body. *N Am J Med Sci*, 6:199-209.
25. Rizvi, SI. and Mishra, N. 2013. Traditional Indian medicines used for the management of diabetes mellitus. *J Diabetes Res*, 712092.
26. Eckel, RH., Longo, DL., Fauci, AS., Kasper, DL., Hauser, SL., Jameson, JL. And Loscalzo J. 2012. *Harrison's Principles of Internal Medicine*. 18th Ed. New Delhi: McGraw-Hill Medical, p. 1992-7.
27. Tandurust .2008. Natural diabetes remedies: benefits of cold and neutral hip bath. June 14. www.tandurust.com/diabetes/diabetes-cold-hip-bath-neutral-hip.html.