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Effect of walking (aerobic isotonic exercise) on physiological variants with special reference to *Prameha* (diabetes mellitus) as per *Prakriti*

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Abstract

Walking is an isotonic aerobic exercise and has been associated with reduced blood sugar level in diabetic patients and other physiological changes in observational studies. A study was conducted to determine the effect of isotonic aerobic exercise (walking) on blood sugar level and other important physiological parameters as per *Prakriti*. This study was carried out in Department of Kriya Sharira and Kayachikita, S. S. Hospital; Faculty of Ayurveda, IMS, BHU and some cases were enrolled from Kashi Mumukshu Bhawan, Assi, Varanasi. A total 83 (32 diabetic control and 51 diabetic exercise) diabetic cases were included with age ranging from 35 to 65 years during January 2009 to January 2011. Control cases enrolled in this study had not performed any exercise. The results of the study revealed that, there is a strong association in between *Prakriti*, Blood pressure and certain other Biochemical parameters.

Key words: Aerobic exercise, diabetes mellitus, exercise, *Prakriti,* walking

Introduction

Ayurvedic physician recommend exercises on daily basis for good health and longevity. The *Ayurvedic* approach to exercise focuses not only on the physical benefits, but also on its positive influence on mind and heart when customized to suit individual needs for balance. Walking (*Parikramana*) is very well described by our Ayurvedic physician in reference to *Prameha*.[1] Exercise (*Vyayama*) is defined as the *Karma* that produces *Ayasa* (tiredness) in the body is known as *Vyayama*.[2] Caraka has described that the effort which produces stability and strength in the body is known as *Vyayama*.[3] *Prakriti*, the build and constitution of the human body is a sum total of morphological, physiological and psychological traits of human beings. *Prakriti* of a man has genetic and acquired aspect, the genetic aspect depends upon *Shukra* and *Shonita*,[4] while acquired constitution develops in relation to environmental factors like climate, season, time factor, age, race and individuals (*Pratyatmniyta*).[5] Walking is very important and most convenient exercise. It can be prescribed for all age group patients mainly in diabetics. In advanced stage of *Prameha*, the patient should put into practice of physical exercise, wrestling, sports, riding elephant, horse and chariot, travelling on foot and moving around and also feats of archery therefore, walking is mainly indicated in *Madhumeha* (diabetes mellitus).[1] It is also mentioned that those who are not doing exercise (physical activity) and taking high calorie diet are mostly prone for *Prameha*.[6] As per Bhela Samhita, life style without exercise is also a cause of Prameha.[7] Diabetes mellitus is defined by American Diabetes Association (ADA) expert committee in their recommendation as group of metabolic disorders characterized by hyperglycemia resulting from defect in insulin secretions, insulin action or both.

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Selection of cases

Diabetic cases were registered from Kaya Chikitsa O.P.D., S.S. hospital; IMS, BHU during January 2009 to January 2011. The selection was random irrespective of sex, occupation and socioeconomic deliberation. All the patients belonged to the age group 35-65 years.

Materials and Methods

In the present study, effect of exercise has been observed in diabetic patients. Thirty minutes walking (Isotonic aerobic exercise) was prescribed to diabetic patients for 3 months (Two follow-ups) on empty stomach. During the study period low calorie diet was prescribed. The diabetic patients had performed walking in their own home under the physicians guidance. Initial step of exercise was 5 minutes of warm up followed by

5 minutes of cool down. Along with walking some important breathing exercises have also prescribed like *Kapalabhati*, *Anuloma–Viloma* and deep slow breathing during both expiratory and inspiratory phases for 15 minutes. Two follow-ups have been completed during study, 1 month and after 3 months. During the study period, the enrolled patients were allowed to consume their routine anti-diabetic medicines.

Study groups

Diabetic individuals were divided into two groups

a. Diabetes mellitus control (DMC) - Diabetic patients who did not perform exercise
b. Diabetes mellitus exercise (DME) - Diabetic patients who performed exercise

Inclusion criteria

Patients aged from 35 to 65 years were included

i. Patients suffering from diabetes Mellitus on the basis of ADA classification of blood sugar level.
ii. Fasting Blood sugar level above 110 and Post Prandial above 140 mg/dl as per the American Diabetes Association (ADA) 2000 criteria.

Exclusion criteria

i. Diabetes mellitus having complications like diabetic nephropathy, retinopathy, neuropathy, etc., and associated secondary diseases.

Parameters

1. **Clinical parameters:** Pulse rate, blood pressure, respiratory rate have been observed before exercise, after 1 month and after 3 months for the proper comparison of result.
2. **Hematological:** Blood sugar, cholesterol (initially, 1 month and after 3 months).

Assessment criteria

***Prakriti* appraisal:** *Prakriti* evaluation is designed on the basis of the elucidation found in Caraka Samhita which, in turn, is based on the specific characteristics of a particular *Dosha*.[8] In this context, Caraka has explained the particular features of a particular *Dosa* and the specific characteristics produced in an individual. Thus, *Vata* has eight (8), *Pitta* has five (5) and *Kapha* has twelve (12) *Gunas* in total. Further, each *Guna* is responsible for producing one or more traits/characters. Thus, three *Dosas* possess neither equal number of *Gunas* nor do they produce equal number of characters/traits in the individuals. This proforma has been designed in such a way that each trait/character as described in *Caraka Samhita* was converted into simple questions/statements along with maintenance of the original version. The subject had to record their agreement or disagreement with the statement/question in a column provided for the purpose in the form of YES or NO. The scores to be allotted were specified against the statement in a separate column for a particular type of response. It was clearly mentioned that if the response of the individual was other than mentioned in the column, the scores to be allotted were ZERO. At the end, of this execute the scores were calculated by researcher for different *Doshas* and could understand the *Dosik* dominance in the form of percentage with the help of simple mathematical calculations. For the sake of ease of calculation, each *Guna* was allotted a total of 120 scores. If a particular *Guna* produced a single trait/character, full scores (120) were allotted to that character, if present in the individual. But, if a *Guna* produced more than one trait/character, then, 120 scores were divided equally into the specific number of characters/traits that the particular *Guna* produced. For example, if one *Guna* produced four traits, then 120 scores were divided by four resulting in 30 scores for each character.

Observations and Results

Study has been divided in to two groups and comprised of total 83 patients in between 35-65 years of age. Maximum number of patients (53.01%) were males [Table 1]. First of all, evaluation of *Prakriti* was done by the proforma prepared for the assessment of *Prakriti* based on distinctiveness described in various standard texts book of Ayurveda. *Deha Prakriti* was designated in terms of three *Dwandaja Prakriti*. *Ekadosaja Prakriti* and *Tridosaja* were not considered in our study because *Ekadosaja Prakriti* is rare while Tridosja Prakriti individuals are free from diseases.

1. *Vata –Pittaja or Pitta-Vataja* (VP)
2. *Vata-Kaphaja or Kapha-Vataja* (VK)
3. *Pitta-Kaphaja or Kapha-Pittaja* (PK)

Distribution of patients as per *Prakriti* - VP patients were maximum 57 (68.67%) in number where as VK *Prakriti* individuals were minimum 8(09.64%) in number [Table 2].

Statistically highly significant ($P<0.001$) decrease in systolic BP was observed in VP, PK and VK *Prakriti* individuals of DME group after walking (isotonic exercise). The individuals with VP *Prakriti* in DME group showed statistically highly significant ($P<0.001$) decrease in mean diastolic blood pressure. A statistically significant ($P<0.05$) decrease was observed in PK *Prakriti* individuals in DME group [Table 3].

The individuals with VP *Prakriti* in DME group showed statistically highly significant ($P<0.001$) decrease in mean pulse rate after walking while, statistically significant ($P<0.05$) result was observed in VK and PK *Prakriti* individuals.

The individuals with VK *Prakriti* in DME group showed statistically highly significant ($P<0.001$) decrease in mean respiratory rate after

Table 1: Incidence of gender as per group

Sex	Group			
	DMC	DME	Total	%
Male	16	28	44	53.01
Female	16	23	39	46.99
Total	32	51	83	100

DMC - Diabetes mellitus control, DME - Diabetes mellitus exercise

Table 2: Incidence of *Prakriti* as per group

Prakriti	Group			
	DMC	DME	Total	%
VP	23	34	57	68.67
PK	6	12	18	21.69
VK	3	5	8	9.64
Total	32	51	83	100

DMC - Diabetes mellitus control, DME - Diabetes mellitus Exercise, VP - *Vata-Pittaja*, PK - *Pitta-Kaphaja*, VK - *Vata-Kaphaja*

walking (isotonic exercise) while statistically significant ($P<0.05$) decrease was observed in VP and PK *Prakriti* individuals. VP *Prakriti* individuals belonging to DMC group shown statistically significant increase in respiratory rate [Table 4].

Increase in fasting blood sugar level was observed in VK and PK individuals of control group (DMC) which was statistical significant ($P<0.05$) and highly significant ($P<0.01$) respectively. In exercise performing group(DME) decrease in FBS level was found in VP and PK *Prakriti* individuals which is statistically highly significant ($P<0.01$).

The individuals with VP and PK *Prakriti* in DME group showed statistically highly significant ($P<0.001$) decrease in post-prandial blood sugar level after walking (isotonic exercise). A statistically significant ($P<0.05$) result was observed in VK individuals of DME group. In case DMC group VP individuals illustrated statistically highly significant ($P<0.001$) increase in post-prandial blood sugar level [Table 5].

The total cholesterol level found significantly increased only in VP *Prakriti* individuals of DMC [Table 6].

Discussion

Several long term studies have demonstrated consistent beneficial effect of exercise on prevention of diabetes. Present study comprised of 83 diabetic individuals belonging to the age group of 35 – 65 years with the aim to find out any correlations that may exist between these physiological parameters and *Prakriti*. There is a strong correlation between changing lifestyle factors and increase in diabetes in India. Maximum number of patients (53.01%) were males. This study was not consistent with other

Table 3: Effect of walking on systolic and diastolic blood pressure as per *Prakriti* in diabetic patients

Group	*Prakriti*	SBP (mmHg) (Mean±SD)		Intragroup comparison paired *t*-test
		Initial	F2	Initial vs F2
DMC	VP (*n*=23)	123.48±16.6	122.26±9.71	*t*=0.292 *P* >0.05 (NS)
	VK (*n*=3)	125.33±2.3	125.33±4.62	t=0.000 (NS)
	PK (*n*=6)	117.5±5.05	118.67±5.89	*t*=0.749 *P* >0.05 (NS)
DME	VP (*n*=33)	144.76±27.45	130.35±21.82	*t*=6.963 *P* <0.001 (HS)
	VK (*n*=5)	128.80±7.56	122±5.09	*t*=4.543 *P* <0.001 (HS)
	PK (*n*=12)	122.2±19.73	113.17±18.20	*t*=3.430 *P* <0.01 (HS)
	Prakriti	DBP (mmHg) Mean±SD		Intragroup comparison paired *t*-test
		BT (Initial)	AT (F2)	Initial vs F2
DMC	VP (*n*=23)	81.83±5.04	80.78±8.47	*t*=0.619 *P* >0.05 (NS)
	VK (*n*=3)	80.00±.00	80.00±.00	–
	PK (*n*=6)	85.00±16.48	79.33±3.72	*t*=0.875 *P* >0.05 (NS)
DME	VP (*n*=34)	88.24±16.28	80.64±10.06	*t*=4.79 *P* <0.001 (HS)
	VK (*n*=5)	83.20±11.88	78.400±6.39	*t*=1.56 *P* >0.05 (NS)
	PK (*n*=11)	82.83±8.20	79.45±6.00	*t*=2.55 *P* <0.05 (S)

SBP - Systolic blood pressure, DBP - Diastolic blood pressure, BT - Before treatment, AT - After treatment, DMC - Diabetes mellitus control, DME - Diabetes mellitus exercise, VP - *Vata-Pittaja*, PK - *Pitta-Kaphaja*, VK - *Vata-Kaphaja*

Table 4: Effect of walking on pulse rate and respiratory rate as per *Prakriti* in diabetic patients

Group	*Prakriti*	Pulse (/minute) (Mean ±SD)		Intragroup comparison paired *t*-test
		Initial	F2	Initial vs F2
DMC	VP (*n*=23)	77.48±5.37	76.61±5.37	*t*=0.696 *P* >0.05 (NS)
	VK (*n*=3)	71.33±1.15	71.33±1.15	–
	PK (*n*=6)	79.33±1.03	79.66 ±2.94	*t*=0.415 *P* >0.05 (NS)
DME	VP (*n*=34)	76.35±6.50	73.47±5.26	*t*=4.261 P < 0.001 (HS)
	VK (*n*=5)	78.80±3.89	74.80±2.28	*t*=3.651 P <0.05 (S)
	PK (*n*=11)	78.18±3.93	76.18±4.05	*t*=2.714 P <0.05 (S)
	Prakriti	Respiratory rate (/minute) (Mean ±SD)		Intragroup comparison paired *t*-test
		Initial	F2	Initial vs F2
DMC	VP (*n*=23)	19.69±4.24	20.39±3.06	*t*=1.400 P <0.02 (S)
	VK (*n*=3)	18.00±.00	18.00±.00	–
	PK (*n*=6)	19.33±1.62	19.33±1.632	*t*=1.00 (NS)
DME	VP (*n*=27)	26.18±11.25	22.96±2.90	*t*=1.474 P <0.02 (S)
	VK (*n*=4)	27.50±1.00	24.00±.00	*t*=7.00 P <0.01 (HS)
	PK (*n*=11)	22.36±3.44	20.36±1.96	*t*=3.028 P <0.02 (S)

DMC - Diabetes mellitus control, DME - Diabetes mellitus exercise, VP - *Vata-Pittaja*, PK - *Pitta-Kaphaja*, VK - *Vata-Kaphaja*

Table 5: Effect of walking on fasting blood sugar and post-prandial blood sugar as per *Prakriti* in diabetic patients

Group	*Prakriti*	FBS (mg/dl) (Mean ± SD)		Intragroup comparison paired t-Test
		Initial	F2	Initial vs F2
DMC	VP (*n*=23)	119.19±12.55	120.72±10.94	*t*=0.759 *P* >0.05 (NS)
	VK (*n*=3)	112.67±4.62	114.33±4.04	*t*=5.000 *P* <0.05 (S)
	PK (*n*=6)	114.33±15.12	116.17±15.69	*t*=5.966 *P* <0.01 (HS)
DME	VP (*n*=34)	126.29± 18.52	110.84±17.52	*t*=3.382 *P* <0.01 (HS)
	VK (*n*=5)	120.40±11.8	123.96±33.13	*t*=0.192 *P* >0.05 (NS)
	PK (*n*=12)	141.67±37.51	106.40±19.94	*t*=3.204 *P* <0.01 (HS)
	Prakriti	PP (mg/dl) (Mean ± SD)		Intragroup comparison paired t-Test
		BT (Initial)	AT (F2)	Initial vs F2
DMC	VP (*n*=23)	186.28±52.66	190.76±54.87	*t*=5.00 *P* <0.001 (HS)
	VK (*n*=3)	180.00±36.37	167.33±47.34	*t*=1.652 *P* >0.05 (NS)
	PK (*n*=6)	143.50±6.56	169.67±39.69	*t*=0.1652 *P* >0.05 (NS)
DME	VP (*n*=34)	198.06±54.14	142.00±14.37	*t*=6.414 *P* <0.001 (HS)
	VK (*n*=5)	234.82±58.43	161.90±31.5	*t*=3.526 *P* <0.05 (S)
	PK (*n*=12)	233.92±84.28	153.54±31.15	*t*=4.121 *P* <0.01 (HS)

DMC - Diabetes mellitus control, DME - Diabetes mellitus exercise,VP - *Vata-Pittaja*, PK - *Pitta-Kaphaja*,VK - *Vata-Kaphaja*, BT - Before treatment, AT - After treatment

Table 6: Effect of exercise on total cholesterol level as per *Prakriti* in diabetic patients

Group	Prakriti	Cholesterol (mg/dl) (Mean±SD)		Intragroup comparison paired *t*-Test
		Initial	F1	Initial vs F1
DMC	VP (*n*=23)	181.16±38.75	192.21±44.08	*t*=2.144 *P*<0.05 (S)
	VK (*n*=3)	187.00±15.58	187.00±15.58	-
	PK (*n*=6)	176.78±25.18	187.50±21.02	*t*=2.176 *P*>0.05 (NS)
DME	VP (*n*=33)	167.10±27.03	159.59±24.89	*t*=1.202 *P*>0.05 (NS)
	VK (*n*=5)	168.30±17.62	154.96±9.54	*t*=1.655 *P*>0.05 (NS)
	PK (*n*=12)	163.55±18.30	156.19±18.11	*t*=1.134 *P*>0.05 (NS)

DMC - Diabetes mellitus control, DME - Diabetes mellitus exercise,VP - *Vata-Pittaja*, PK - *Pitta-Kaphaja*,VK - *Vata-Kaphaja*

because the maximum numbers of studies have shown high prevalence of female diabetics world wide.[9] Maximum number of cases belonged to *Vata–Piitaja* (VP) *Prakriti* and minimum number of cases belonged to Vata-Kaphaja (VK) *Prakriti*. VP *Prakriti* individuals were very reactive to any kind of stimuli. It is very well defined by our Ayurvedic classical text books[10-12] that maximum number of diseases will be caused by *Vata*. Diastolic blood pressure was decreased in VP and PK *Prakriti* in diabetic exercise group after walking (isotonic exercise) which is statistically significant. Decrease in diastolic blood pressure after exercise may be caused due to decrease in peripheral resistance by producing vasodilatation through accumulation of metabolites like carbon dioxide and hydrogen ion because the diastolic blood pressure is directly affected by peripheral resistance. Systolic blood pressure also falls due to decreased sympathetic discharge after 30 minutes walk for 3 months. Some previous studies have shown that systolic and diastolic blood pressure was decreased after aerobic exercise.[13,14] The present study also confirms the findings of earlier workers. VP *Prakriti* individuals have greater degree of *Raja Dosha* than *Kapha Dosha*. So the individuals are more reactive to any kind of stimuli and prone to develop chronic stress leading to different kind of psychosomatic disorders. In this study maximum number of individuals belonge to VP *Prakriti*. They were prone different kinds of diseases. The reason for this could be that *Pitta* is responsible for intelligence and *Vata* is responsible for initiation and enthusiasm.[15] Pulse is lower when individuals are at rest and increases during exercise (because more oxygen-rich blood is needed by the body when an individual exercises). On intra group comparison after first follow up, a statistically highly significant ($P<0.001$) decrease in pulse rate was observed in DME after walking (isotonic exercise) whereas it was just significant in PK *Prakriti* of DME group [Table 4]. As activity level decreases, vasopressin agents that increase heart rate are decreased in a reverse feedback loop of blood pressure homeostasis. Also, the heart rate partly depends on Starling's law, which indicates that the more volume of blood enters the heart, the more will be pumped out. With a lower blood return after exercise, the heart will respond by beating both more slowly and also with less force per beat other study had shown the decreased sympathetic stress after exercise interventions causes decrease in pulse rate. This type of studies could not find till now. Aerobic exercise increases oxygen consumption and improve functioning of the cardiovascular and respiratory systems. Maximum breathing capacity is about 50% greater than actual pulmonary ventilation during maximum exercise. Respiratory rate has been decreased after 3 months of isotonic exercise this result may be due to the fact that the breathing exercises also results in decreased respiratory rate. Some previous studies stated that exercise decreases the respiratory rate if observed immediately. Current study period was three month. As per Table 4, VK *Prakriti* in DME group showed statistically highly significant ($P<0.001$) decrease in mean respiratory rate after walking (isotonic exercise).

A statistically significant ($P<0.05$) decrease was observed in VP *Prakriti* individuals in DME group, PK *Prakriti* individuals in DME group. VK *Prakriti* individuals show significant changes in Respiratory rate in group DME. Whereas changes observed in control group were within normal limits. Studies also reported that respiratory rate will not significantly change with *Prakriti*.[16] With continued moderate exercising, however, muscles take up glucose at almost 20 times the normal rate. This lowers blood sugar levels. Blood glucose levels decreased during periods of exercise due to increased permeability of glucose in peripheral tissues. Glucose levels are the primary cause of cardiovascular and neurological disorders in diabetics. Exercise should primarily be aerobic.[17] In present study remarkable decrease in FBS was observed after walking and FBS is more reliable marker for diabetic individual.[18] Studies reported that fasting blood sugar level decreased after the exercise[18] and it was consistent to this study. VP *Prakriti* **in** DMC **and** DME group [Table 5] showed statistically highly significant change in post-prandial blood sugar level after walking (isotonic exercise).[19] This means blood sugar level can be easily controlled in VP *Prakriti* individuals. This observation may due to *Chala Guna* of *Vata* which promote quick peripheral utilization of glucose. If they discontinue exercise, relapses may be observed. This means PK individuals with Diabetes are easily curable because *Kapha Prakriti* individuals are having very good compliance. Interpretation can be drawn from the above observation that diabetic patients have better response to exercise than hypertensive patients as per *Prakriti*. It is very well defined in Ayurvedic text books that in advanced stage *Prameha*, exercises like physical exercise, wrestling, sports, riding elephant, horse and chariot, travelling on foot and moving around and also feats of archery are to be practiced. Hence, walking is mainly indicated in *Madhumeha* (diabetes mellitus).[1] It is also mentioned that those who are not doing exercise (physical activity) and taking high-calorie diet are mostly prone for *Prameha*.[6,7] DM Control group has shown increased post-prandial blood sugar level, it means individuals who did not perform exercise are very prone to develop diabetes. Interpretation can be drawn from this observation that exercise is prophylactic as well as curative treatment during very early stages of diabetes. Total cholesterol levels are lower in persons with high aerobic fitness compared to low aerobic fitness, it has not been conclusively demonstrated that exercise lowers total cholesterol. Measurements made before and after exercise have produced variable results with no clear consensus as to whether or not moderate or vigorous exercise can lower total cholesterol. In studies, where total cholesterol has been significantly reduced, it appears that the activities were more dynamic and vigorous in nature, such as running programs. In contrast to the variable effects of exercise on total cholesterol, endurance exercise consistently lowers triglycerides.[20] A physically active lifestyle may help to prevent age-related rise in triglycerides normally observed in men. It also appears that endurance exercise lowers triglyceride levels more in the patients who had initial baseline levels elevated. Lower triglyceride concentrations in the blood have been attributed to increase in skeletal muscle and adipose tissue lipoprotein lipase activity from aerobic training. Lipoprotein lipase is the key enzyme for the breakdown of triglyceride rich lipoproteins. On a long-term basis, decrease of body fat that often accompanies endurance training may be a contributing factor for this lowering effect of triglycerides due to exercise. Some studies have reported that decreased lipid profile level due to some biochemical changes take place during exercise.[21]

Control groups have shown increased cholesterol levels whereas in exercise intervention group decreased level of cholesterol was found but these changes are within normal limits [Table 6]. It suggests that walking is prophylactic in diabetic patients for the control of lipid level which is the risk factor for diabetic individuals.

Conclusions

The present work covered a study of 83 cases. Out of these 44 males, 39 females. In this research work, maximum number of cases 57 (68.67%) belonged to *Vata – Piitaja* (VP) *Prakriti* and minimum number of cases 8 (9.645%) belonged to *Vata-Kaphaja Prakriti*. Incidence of male patients was high. In nut shell, on the basis of the observations, it can be concluded that the systolic blood pressure, diastolic blood pressure, pulse pressure and respiratory rate are the specific responses that may have a strong association with the *Prakriti* of an individual at certain physiological conditions. Along with it, certain other biochemical parameters i.e., blood sugar level, lipid profile have shown strong association with *Prakriti* and walking in diabetic individuals. *Vata–Piitaja* (VP) *Prakriti* individuals have shown maximum response in the study. Certain other biochemical parameters i.e., blood sugar level, lipid profile have shown strong association with *Prakriti* and exercise. Walking is effective in maintenance of health, prevention of diseases like diabetes mellitus.

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हिन्दी सारांश

प्रकृति के अनुसार प्रमेह रोगी में व्यायाम का महत्व

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व्यायाम के रुप में मुख्यतः पैदल चलना स्वास्थ्य के लिए बहुत महत्वपूर्ण है । सुश्रुतानुसार प्रमेह रोगी को १०० योजन या उससे अधिक चलना चाहिए । प्रमेह रोगियों का चयन कायचिकित्सा ओ.पी.डी. से किया गया । ये वो रोगी थे जिनका रक्तशर्करा का स्तर चिकित्सा के बावजूद नियन्त्रण में नहीं था । उनकी प्रमेहघ्न चिकित्सा को जारी रखते हुए उन रोगियों को प्रतिदिन ३० मिनट पैदल चलना और १५ मिनट का प्राणायाम बताया गया । ३ महीने तक यह प्रयोग कराया गया । सभी प्रतिभागी की उम्र ३५ – ६५ वर्ष थी । यह अध्ययन विभाग में बनाये गये प्रोफार्मा के अनुसार किया गया । इस अध्ययन में यह पाया गया कि वात–पित्त प्रकृति वाले प्रमेह रोगियों को ५–६ किलोमीटर प्रतिदिन पैदल चलने पर उनमें रक्तशर्करा की मात्रा कम हो जाती है, साथ–साथ उनका रक्तचाप, नाड़ी, श्वसन प्रक्रिया और रक्तगत वसा का स्तर भी नियंत्रित रहता है क्योंकि व्यायाम हमारे शरीर की क्रियाओं को संतुलित रखता है । वात–पित्त प्रकृति में यह परिणाम इसलिये अच्छा पाया गया क्योंकि वात प्रकृति में रजगुण प्रधान होता है ।