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Original Research Article

Role of Aahar and Panchakarma on restoration of euglycemia in known type II diabetes mellitus

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ABSTRACT

Background: Diabetes mellitus, in particular, has emerged as a significant health concern, affecting millions of individuals and placing a considerable strain on the healthcare system. Promoting remission of diabetes, wherein patients achieve a state of sustained blood sugar control without the need for ongoing medication or with a reduced reliance on medication, can yield remarkable benefits. This study sought to understand the role of *Aahar* and *Panchakarma* on restoration of euglycemia in known type 2 diabetes patients.
Methods: A retrospective, observational, cohort study was conducted at Madhavbaug Cardiac Care Clinic between April 2021 and April 2022 in Maharashtra, India. Patients aged 18 years and older with a diagnosis of type 2 diabetes mellitus with glycated haemoglobin level (HbA1c) >7% and had participated in the Comprehensive Diabetes Care (CDC) program were included in this study. Parameters such as HbA1c, body weight, body mass index (BMI), and dependence on conventional allopathic medication were assessed at the end of the CDC program. Follow-up was conducted at 90 days. Day 1 and day 90 data were compared.
Results: Of the 45 patients, 17 (40.5%) patients had a negative glucose tolerance and 14 (33.3%) patients had impaired glucose tolerance. HbA1c, body weight, and BMI improved at the end of CDC program. Dependency on conventional allopathic medications was also reduced.
Conclusions: Restoration of euglycemia in patients with type 2 diabetes mellitus is possible, however, further studies to understand the affecting factors are warranted.

Keywords: Ayurveda, Body mass index, Diabetes mellitus, Glycosylated haemoglobin, Panchakarma

INTRODUCTION

Diabetes mellitus is a non-communicable endocrine disorder of metabolic origin. It occurs due to reduced insulin production or resistance to its effects, resulting in hyperglycaemia. The signs and symptoms include excessive urine production causing increased thirst and consequently increased fluid intake, blurred vision, unexplained weight loss, lethargy and changes in energy metabolism.[1] A vast number of people, around 183 million, are unaware that they have diabetes, according to estimates from the International Diabetes Federation. Tragically, diabetes or its complications claim the lives of approximately 3.2 million individuals worldwide.[2]

India is facing an alarming surge in the prevalence of diabetes mellitus and has become one of the largest diabetic nations. Drugs of the classes including

biguanides, thiazolidinediones, sulfonylureas, alpha-glucosidase inhibitors, glucagon-like peptide1 antagonists, amylin analogues, and sodium-glucose cotransporter inhibitors are prescribed as treatment for diabetes mellitus. However, these medications come with several side effects.[3]

Ayurveda, an ancient science originating in India, offers a holistic approach that integrates lifestyle, wellness, diet, and energy balance. These principles can be effectively translated and integrated into modern medicine. The concept of integrative medicine is gaining acceptance, particularly in addressing chronic lifestyle diseases like diabetes mellitus. Ayurveda employs a wide array of herbs, polyherbal formulations, herbomineral preparations, and therapeutic techniques like Panchakarma, meditation, and yogic exercises to alleviate and manage diabetes mellitus based on individual patient needs. This ancient medicinal practice holds promise as a complementary approach in the contemporary treatment of diabetes mellitus.[2] Against this background the current study sought to understand the role of Aahar and Panchakarma on restoration of euglycemia in known type 2 diabetes patients.

METHODS

Study design

A retrospective, observational, cohort study was conducted at Madhavbaug Cardiac Care Clinic in Maharashtra, India between April 2021 and April 2022. A total of 45 patients above the age of 18 years with a diagnosis of type 2 diabetes mellitus in accordance with the American Diabetes Association. Patients with a diagnosis of type 1 diabetes mellitus or low body mass index (BMI) were excluded from the study. Prameh, Gobipi, and Reverse diet kits from Madhavbaug Cardiac Care Clinics, consisting of low carbohydrates, low fats and moderate amounts of proteins were also taken by the study patients.

Comprehensive diabetes control program

The Comprehensive Diabetes Control (CDC) program consists of a 3-step procedure wherein each session is approximately 65-75 mins. The procedure is performed on patients following a light breakfast. *Snehana* is the first procedure, consisting of massaging of Neem oil in a centripetal direction on the hands, legs, shoulders, thorax, and abdomen. Duration of the procedure spans 15–25 mins with each body part receiving 15–30 strokes. *Swedana*, the second procedure involves heat therapy with *Dashmoola* decoction while the patient lies in a wooden box, in supine position. This therapy lasts 10–15 mins, followed by a resting period of 3–4 mins. The third and final procedure, *Basti* is a medicated enema composed of Gymnema sylvestre, *Berberis aristate*, *Glycyrrhiza glabra* combined to form 100 ml. Rectal administration for more than 15 mins ensures the drug stays in the body and enables maximum absorption. The CDC program was practiced over a period of 90 days and comprised of 6 sessions (4 in the first month, and one in the second and third months). Patients were limited to 800–1000 daily calorie intake.

Glucose tolerance test

The glucose tolerance test, also known as oral glucose tolerance test, measures the body's response to sugar (glucose). The glucose tolerance test can be used to screen for type 2 diabetes. This test indicates glucose metabolism strength of an individual, 75 gm of oral sugar infusion was given to the patients after collection of fasting samples, and again after 1 hr and 2 hrs, post prandial blood sugar was recorded. Patients were asked to sit in one position for the duration from fasting till 2 hrs after sampling. No oral hypoglycemic agent (OHA) or insulin was taken before or during the procedure. Normal glucose tolerance was considered as <90 mg/dl after fasting, <180 mg/dl at 1 hr, and <140 mg/dl at 2 hrs. Impaired glucose tolerance was considered as <90 mg/dl after fasting, >180 mg/dl at 1 hr, and <140 mg/dl at 2 hrs. Diabetes was considered as >90 mg/dl at fasting, >180 mg/dl at 1 hr, and >140 mg/dl at 2 hrs.

Data collection

Patient data such as demographics, anthropometrics, laboratory findings, and medications data for analysis were extracted from the patients' medical records. A detailed patient history was taken and anthropometric measurements, and fasting serum HbA1c levels were measured and collected on day 1 of the CDC program. Details regarding the patients' antidiabetic medication was also recorded. This data collection process was repeated on day 90 of the CDC program. Data was only collected and analyzed from patients who completed 6 complete sessions.

Statistical analysis

Continuous data are indicated as mean±standard deviation while categorial data are expressed as number (percentage). The difference between baseline and follow-up at 90 days was determined with the paired t test. P value ≤0.05 was considered statistically significant. Software used for data analysis was R Version 3.4.1.

RESULTS

Glucose tolerance test

A total of 45 patients underwent glucose tolerance testing. Of the 45 patients, 17 (40.5%) patients had a negative glucose tolerance and 14 (33.3%) patients had impaired glucose tolerance. The findings of the glucose tolerance test are displayed in Figure 1.

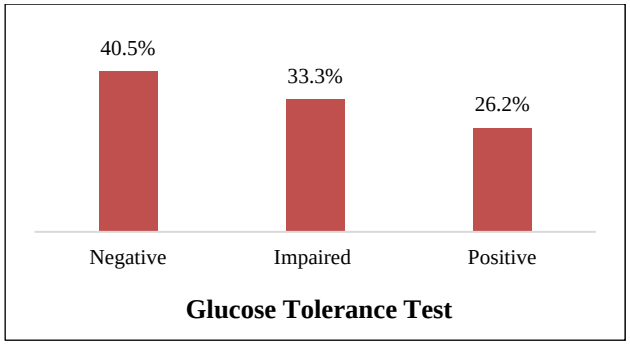

Figure 1: Glucose tolerance test findings.

According to age, HbA1c levels of the patients aged 30-55 years and 55-80 years decreased by 20.60% and 20.65%, respectively. According to gender, HbA1c levels of males and females decreased by 20.19% and 21.27%, respectively. According to HbA1c classification, HbA1c levels in the range 5.7-7.0%, 7.1-10%, and 10.1-13.0 decreased by 8.87%, 19.10%, and 42.98%, respectively.

According to BMI classification, HbA1c levels of normal weight, overweight, obese 1, obese 2, and morbid obese patients decreased by 18.70%, 17.73%, 15.42%, 22.56%, and 30.56%, respectively. Impact age, gender, HbA1c classification, and BMI classification on HbA1c levels is shown in Table 1.

Table 1: Impact of age, gender, HbA1c classification, and BMI classification on HbA1c levels.

Variables	Day 1 (%)	Day 90 (%)	Percent change
Age (years)			
30–55	7.89±2.00	6.27±0.82	-20.60
55–80	7.67±1.36	6.08±0.51	-20.65
Gender			
Male	7.84±1.62	6.26±0.63	-20.19
Female	7.66±1.77	6.03±0.72	-21.27
HbA1c classification			
5.7–7.0	6.44±0.30	5.86±0.47	-8.87
7.1–10	7.85±0.69	6.35±0.77	-19.10
10.1–13.0	11.28±0.85	6.43±0.46	-42.98
BMI classification			
Normal weight	7.71±1.71	6.27±0.68	-18.70
Overweight	7.43±1.29	6.11±0.33	-17.73
Obese 1	7.13±0.82	6.03±0.55	-15.42
Obese 2	7.98±1.71	6.18±0.91	-22.56
Morbid obese	8.88±6.16	6.16±0.80	-30.56

HBA1c-glycated haemoglobin level, BMI-body mass index.

Impact of age, gender, weight, and Hba1c classification on weight

According to age, weight of patients aged 30-55 years and 55-80 years decreased by 9.21% and 6.87%, respectively. According to gender, weight of males and females decreased by 7.91% and 8.08%, respectively. According to HbA1c classification, weight of the patients in the range 5.7-7.0%, 7.1-10%, and 10.1-13.0 decreased by 8.03%, 7.93%, and 7.96%, respectively. According to BMI classification, weight of normal weight, overweight, obese 1, obese 2, and morbid obese patients decreased by 2.54%, 7.91%, 11.63%, 7.18%, and 12.37%, respectively. Impact age, gender, HbA1c classification, and BMI classification on weight is detailed in Table 2.

Table 2: Impact of age, gender, weight, and Hba1c classification on weight.

Variables	Day 1 (kg)	Day 90 (kg)	Percent change
Age (years)			
30–55	73.78±13.68	66.98±10.64	-9.21
55–80	68.37±12.24	63.67±10.64	-6.87
Gender			
Male	74.15±13.85	68.28±10.70	-7.91
Female	65.91±10.35	60.59±9.10	-8.08
HbA1c classification			
5.7–7.0	71.46±12.52	65.72±10.12	-8.03
7.1–10	69.20±12.79	63.71±10.27	-7.93
10.1–13.0	74.12±15.32	68.22±13.03	-7.96
BMI classification			
Normal weight	59.25±6.03	57.79±5.56	-2.54
Overweight	65.33±8.30	60.09±8.30	-7.91
Obese 1	72.48±7.18	7.18±7.40	-11.63
Obese 2	87.93±8.25	8.25±7.12	-7.18
Morbid obese	84.51±7.77	7.77±6.88	-12.37

HBA1c-glycated haemoglobin level, BMI-body mass index.

Impact age, gender, weight, and Hba1c classification on BMI

According to age, BMI of patients aged 30-55 years and 55-80 years decreased by 9.05% and 7.00%, respectively. According to gender, weight of males and females decreased by 8.44% and 7.24%, respectively. According to HbA1c classification, weight of the patients in the range 5.7-7.0%, 7.1-10%, and 10.1-13.0 decreased by 8.48%, 7.52%, and 7.89%, respectively.

According to BMI classification, weight of normal weight, overweight, obese 1, obese 2, and morbid obese patients decreased by 16.46%, 7.45%, 11.53%, 6.54%, and 12.36%, respectively. Impact age, gender, HbA1c classification, and BMI classification on BMI is demonstrated in Table 3. Dependency on medication also decreased as shown in Figure 2.

Diet kit consumption

Prameh, Gobipi, and Reverse diet kits from Madhavbaug Cardiac Care Clinics, consisting of low carbohydrates, low fats and moderate amounts of proteins were also taken by the study patients. The diet kit consumption details are given in Table 4.

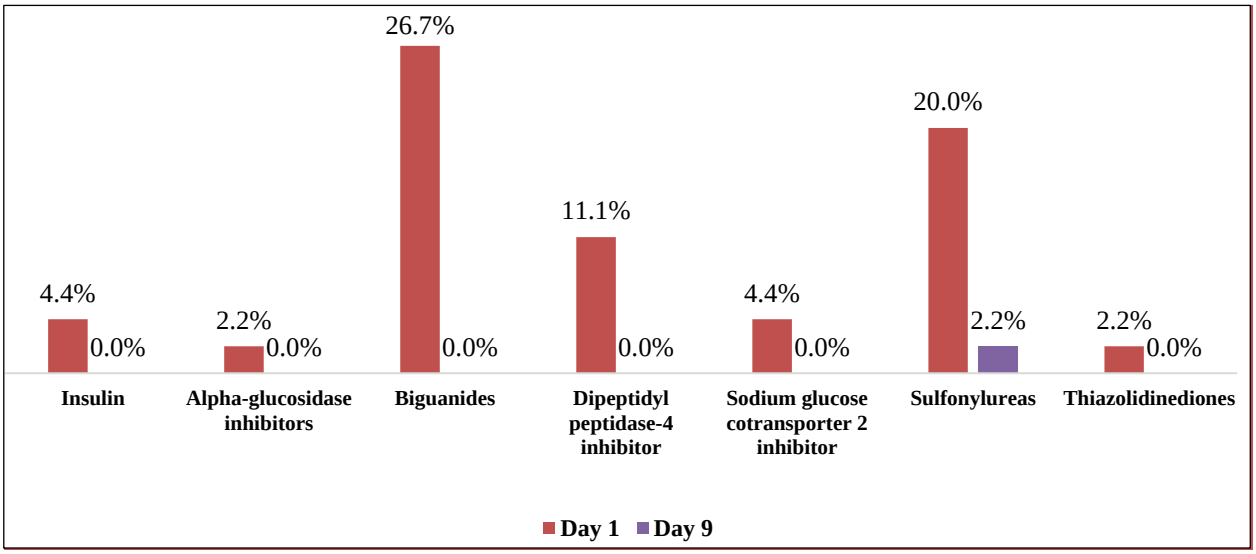

Figure 2: Dependency on medication.

Table 3: Impact age, gender, weight, and Hba1c classification on BMI.

Variables	Day 1 (kg)	Day 90 (kg)	Percent change
Age (years)			
30–55	28.28±4.42	25.72±3.36	-9.05
55–80	26.95±3.72	25.06±2.82	-7.00
Gender			
Male	27.58±4.06	25.26±2.92	-8.44
Female	27.50±4.17	25.51±3.33	-7.24
HbA1c classification			
5.7–7.0	27.05±3.75	24.75±3.03	-8.48
7.1–10	27.90±4.09	25.80±2.78	-7.52
10.1–13.0	27.88±4.89	25.68±3.86	-7.89
BMI classification			
Normal weight	22.15±1.80	22.15±11.04	16.46
Overweight	24.68±1.06	24.68±0.93	-7.45
Obese 1	28.44±0.42	25.16±1.12	-11.53
Obese 2	30.86±0.58	28.85±0.84	-6.54
Morbid obese	33.54±1.40	29.39±1.64	-12.36

HBA1c-glycated haemoglobin level, BMI-body mass index

Table 4: Diet kit consumption details.

Diet kit count	No of diet kit	BOBIPI	Prameh	Reverse
0	11	0	0	0
1	0	0	5	0
2	0	2	7	3
3	0	1	15	1

DISCUSSION

Diabetes mellitus is endemic in both developed and developing countries. Approximately 3.2 million individuals around the world succumb to diabetes mellitus or its complications-thus the need of the hour is exploring novel therapeutic alternatives for the management of diabetes mellitus.[2] The current study sought to understand the role of *Aahar* and *Panchakarma* on restoration of euglycemia in known type 2 diabetes patients.

The American Heart Association advocates the use of HbA1c as an alternative to fasting blood glucose for diagnosing diabetes mellitus. This crucial indicator offers insights into long-term glycaemic control, reflecting the cumulative glycaemic history over the preceding 2-3 months. Beyond its diagnostic value, HbA1c also strongly correlates with the risk of long-term complications associated with diabetes. Furthermore, elevated HbA1c levels have been identified as an independent risk factor for coronary heart disease and stroke, both in patients with and without diabetes. The ability of a single HbA1c test to provide valuable information has established it as a reliable biomarker for diagnosing and prognosing diabetes.[4] An HbA1c ≥6.5% indicates diabetes, 5.7-6.4% is considered as borderline/ prediabetes, and <5.7% is considered normal. To achieve improved management of diabetes, treatment strategies strive to maintain HbA1c levels <6.5%.[5] Studies employing HbA1c levels to assess the progress patients with diabetes mellitus have been conducted in the recent past. Sane et al observed decrease in HbA1c levels from 8.80±0.93% at day 1 to 6.98±1.73 at day 90.[6] Sane at al documented decrease in HbA1c levels from 9.02±1.79% at day 1 to 6.86±1.24% at day 90.[7] Sane et al reported decrease in HbA1c levels from 8.27±0.96 at day 1 to 7.1±1.30 at day 90.[8] Shingan et al documented a decrease in HbA1c levels from 7.87±1.90% to 5.79±0.51% at day 90.[9] Sane et al observed a decrease in HbA1lc levels from 9.02±1.79% to 6.86±1.24%.[10] Sane et al observed a decrease in HbA1c levels from 8.64±0.93% to 7.00±1.73%.[11] Other studies are in line with the above findings.[12]

There are a few limitations of the current study. The first is the small sample size. The second is the short follow-up eluding the long-term outcomes of this treatment.

CONCLUSION

Regardless of obesity and glycaemic control, Restoration of euglycemia in patients with type 2 diabetes mellitus is possible, with 12 weeks of negative calorie balance and Ayurved detoxification therapy, however, further studies to understand the affecting factors are warranted.

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Ethical approval: Not required

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