Case Study

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# AYURVEDIC STRATEGIES FOR MANAGING PRE-DIABETES: A CASE STUDY

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**ABSTRACT**

Pre-diabetes has a high prevalence, with early detection essential to facilitate optimal management to prevent the development of conditions such as Type 2 Diabetes and cardiovascular disease. Pre-diabetes can include impaired fasting glucose, impaired glucose tolerance and elevated HbA1C. The American Diabetes Association defines pre-diabetes as having an HbA1C level of 5.7-6.4%, distinguishing it from normal levels below 5.7%. According to Ayurvedic principles, the Vata and Kapha dosha are involved in this condition. Various Ayurvedic medicines are mentioned in Ayurvedic classics regarding regularly maintaining glucose levels. A 43-year-old male patient who had no clinical condition of hypertension, diabetes mellitus, incidental finding of HbA1C level in the pre-diabetes range and complaints of weakness and numbness over bilateral upper limbs for 8 months. Additionally, the patient experienced altered mood, loss of interest and increased stress for 6 months. Pre and post-assessment of glycaemic parameters (HbA1C, FBS, and PPBS) lipid profiles were done. The major outcome of this case is a greater reduction of HbA1C from inadequate control to close to every day. Marked changes were observed in weight, BMI and waist circumference. This case showed the effectiveness of Ayurveda interventions and lifestyle modifications in reducing insulin resistance and helping to maintain glycemic parameters. In addition, the patient could withstand his diabetic profile in normal.

**Keywords**: Ayurveda, Pre-diabetes, Prameha, Shamana, Pathya-apathya

## INTRODUCTION

Pre-diabetes is a metabolic disorder characterized by hyperglycemia, with specific biomarker ranges: HbA1C 5.7%-6.4%, Fasting Blood Sugar (FBS): 100-125 mg/dl, Postprandial Blood Sugar (PPBS): 140-200 mg/dl. This condition shares similarities with Ayurvedic Prameha, marked by symptoms like polyuria (excessive urination), turbid urination, and polydipsia (dryness of mouth and throat)[1]. Research links pre-diabetes to increased risks of kidney disease, cardiac dysfunction, male infertility, and idiopathic polyneuropathy[2]. In Ayurveda, Prameha is categorized into 20 sub-types based on dosha involvement and urine presentation, ultimately progressing to Madhumeha (Diabetes mellitus)[3]. Management of pre-diabetes involves lifestyle interventions and oral hypoglycemics, especially in cases with co-morbidities. However, oral hypoglycemic agents can deteriorate quality of life and exacerbate complications[4]. According to Ayurvedic principles, Prameha arises from mandagni (low digestive fire and metabolism)[5], bahudosha (excessive dosha), bahudrava shleshma (Kapha with increased liquidity), abaddhameda (elevated bad cholesterol and triglycerides), kleda (excessive fluidity) in the body, all related to Kapha imbalance[6].

### Patient Information

A male patient aged about 43 years who is N/K/C/O HTN, DM came for consultation in July 2022 with complaints of weakness and numbness over B/L Upper limbs for 8 months.

Also, complaints of altered mood, loss of interest in daily activities and increased work-related stress for 6 months and during physical examination and investigation and finding of HbA1C level in pre-diabetes range.

**Table 1: The clinical events of the patient**

| Year | Clinical Events |
|---|---|
| Dec 2021 - Feb 2022 | Intermittent weakness and numbness in bilateral upper limbs (R > L), worsening with strenuous activities for 8 months.<br>Altered mood, decreased interest in daily activities, and increased work-related stress for 6 months. |
| Jul 2022 | As the aggravation of the symptoms was noted and approached for the management of same, given oral medication for 7 days and advised to review with routine blood investigations. (FBS, PPBS, HbA1C, Lipid Profile) |
| Aug 2022 | The patient came for a follow-up and noticed an HbA1C Level in the pre-diabetes range in Blood reports |

**Personal History (Since Last 5 Years)**

- Ahara - Mixed diet of chicken/mutton/fish thrice per week followed by milk products like buttermilk, curd, spicy and junk food; consumes homemade rice, chapati, dosa, vegetables, pulses and mango pickle for breakfast and dinner; consumes lunch from the hotel.
- Vihara - Stressful and sedentary lifestyle (works in front of a computer for 6-7 hours/day); an average distance of 10 km travelling per day on bike.
- Vyasana - Alcohol beer one bottle regularly for 7-8 years (once a month), left a month back. Tea twice/day regularly for 10 years.
- Mala - Prakruta, once/day, clear
- Mutra - 4-5 times/day, 0-1 time at night
- Vihara - Divaswapna (1-2 hours /day)
- Nidra - Nidralpata.

Psycho-social history – Chinta (excessive thinking) due to job-related issues.
Family history - Mother is a known case of Type 2 Diabetes mellitus.
Past medical history - No contributory factors related to the current health condition.

**Sroto Pareeksha**

The physical examination and systemic examination are mentioned in Table 2.

**Table 2: Clinical Examination and Findings**

| **General Examination** | |
|---|---|
| **Physical Examination** | **Systemic Examination** |
| The General examination was normal, and no significant abnormalities were noted.<br>Built - Mesomorphs<br>Nourishment - Moderately nourished<br>Cyanosis - Absent<br>Clubbing - Absent<br>Edema - Absent<br>Pallor - Absent<br>Icterus –-Absent<br>Lymphadenopathy - Absent<br>BP - 140/90 mmHg<br>PR - 79/min<br>RR - 20/min<br>$SpO_2$ - 98%<br>BMI - 23.2 $kg/m^2$ | CNS - The patient was conscious and well-oriented to time, place, and person, and all cranial nerves were intact.<br>CVS - S1 S2 heard on added sounds.<br>RS - Normal Broncho-vesicular sounds were heard over bilateral chest walls. |

**Ashtastana Pareeksha**

Nadi - Pitta Vata-pradhanamanda nadi,
Mutra - Prakruta,
Mala - Prakruta,
Jihwa - Alipta,
Shabda - Prakruta vak and grahana,
Sparsha - Anushna sheeta,
Druk - Prakruta,
Akruti – Madhyama.

**Dashavidha Pareeksha**

Prakruti - Pitta Vata,
Vikruti - Kapha Pitta,
Sara - Madhyama,
Samhanana - Madhyama,
Pramana - Madhyama,
Saatmya - Sarva rasa satmya,
Satwa - Madhyama.

**Diabetes Risk Assessment as Per Madras Diabetes Research Foundation [MDRS] And Indian Diabetes Risk Score [IDRS].**[7]

Maximum score 100
Score obtained 60

**Proposed Timeline of Data Collections**

**Table 3: Proposed timeline of data collections**

| Day | Procedure | Investigation |
|---|---|---|
| Day 1 | Screening | FBS, PPBS, HbA1C, Lipid profile, CBC |
| Day 10 | Oral Medications | |
| Day 60 | Oral Medications | FBS, PPBS, HbA1C |
| Day 90 | Follow up | |
| Day 260 | Follow up | |
| Day 380 | Follow up | FBS, PPBS, HbA1C, Lipid profile |

**Diagnosis**

**Diagnostic Testing**

**Table 4: Investigation Report**

| | |
|---|---|
| 28/07/2022 | HbA1C<br>6.47% |

**Table 5: Proposed Treatment Plan**

| Date | Clinical Events | Intervention | Dosage |
|---|---|---|---|
| 1st Visit (July 2022) | Complaints of weakness and numbness in the last 8 months<br>Also, complaints of altered mood, loss of interest in daily activity and increased work-related stress for 6 months. | C.Ksheerabala 101<br><br>The tablet combines Malkanganibeeja, Shankhapushpi, Brahmi, Ashwagandha, Abhraka bhasma<br><br>Ksheerabala tailam | 2 tablets twice daily before food<br><br>1 tablet twice daily after food<br><br>For external application |
| 1st Follow up (1st Aug 2022) | Mild relief over symptoms<br>Weakness persists<br>Complaint of unsatisfied bowel habits<br>Complaint of skin lesion over groin. | C. Ksheerabala 101<br><br>The tablet combines extracts of Meshashringi, Bijaka, Jambu, Amalaki, Karavella, and Haridra<br><br>Ayaskruthi<br><br>Tablet combines of Malkanganibeeja, Shankhapushpi, Brahmi, Ashwagandha, Abhraka bhasma<br><br>T. Anuloma DS<br><br>Ksheerabala tailam<br><br>Twaqure cream | 2 tablets twice daily before food<br><br>2 tablets twice daily before food<br><br>25 ml twice daily after food with an equal quantity of water<br><br>1 tablet twice daily after food<br><br>1 tablet at bedtime<br><br>For external application<br><br>For external application |
| 2nd Follow up (20th Sep 2022) | Moderate relief over symptoms | C. Ksheerabala 101<br><br>Ayaskruthi<br><br>T. Manasamithra vatakam<br><br>Ksheerabala tailam | 2 tablets twice daily before food<br><br>25 ml twice daily after food with an equal quantity of water<br><br>1 tablet at bedtime<br><br>For external application |
| 3rd Follow up (20th Oct 2022) | Significant relief over complaints.<br>Weakness and numbness Reduced | C. Ksheerabala 101<br><br>Ksheerabala tailam | 1 tablet once daily in the morning before food<br><br>For external application |
| 4th Follow up (10th April 2023) | Came for follow-up<br>Numbness presents occasionally | Ksheerabala tailam | For external application |
| 5th Follow up (16th October 2023) | Came for follow-up<br>Numbness presents occasionally | Ksheerabala tailam | For external application |

**Table 6: Diet and lifestyle modification schedule chart**

| Daily events | Do's | Don'ts |
|---|---|---|
| Ahara | | |
| Early morning | Drink 250-300 ml of lukewarm water about 30 minutes before bowel movements to facilitate smooth evacuation. | Avoid drinking cold or icy water before bowel movements. Do not consume boiling water, as it may cause discomfort. |
| Breakfast | Include fibre-rich whole cereals in diet, such as barley, bajra, maize, ragi, and preparations made from these grains.<br>Consume fruits rich in fibre and antioxidants, including papaya, pomegranate, and apple. | Avoid consuming fried foods (e.g., rissoles, fried snacks), bakery items (e.g., pastries, cakes), processed/packed foods, and frozen meals; limit or avoid stimulant beverages: tea and coffee. |
| Lunch | Whole grains: red rice. Protein-rich pulses: chickpea, pigeon pea, horse gram, green gram. Leafy vegetables (in moderation): pointed gourd, bitter gourd, drumstick, radish. Healthy oils: sesame oil, linseed oil. | Dairy products: curd, milk, milk products. Sweet treats: sweets. Fried and processed foods: rissoles, fried items, bakery items, packed food, frozen items. |
| Dinner | Follow the lunch menu with reduced portion sizes. Eat between 7 pm and 8 pm for optimal digestion. | Avoid heavy meals; no fried or oily foods; limit spicy or pungent foods; avoid sugary or processed desserts; no caffeine or stimulant beverages; skip high-sodium or salty foods; limit dairy products (curd, milk, cheese). |
| Vihara | | |
| | Get up early before sunrise (05:30-6:30 am). | |
| | Regular exercise on an empty stomach for a minimum of 15 minutes daily (morning/evening). | |

## RESULTS AND DISCUSSION

The following outcome measures were obtained in this case: Serum HbA1C level (%), Fasting and Post Prandial blood glucose level (mg/dl), Lipid profile (mg/dl), Weight (kg), Waist circumference (cm), BMI (kg/m$^2$), Skin fold thickness (cm) and symptomatically.

The major outcome of this case is a significant reduction in HbA1C, shifting from pre-diabetes to normal levels. Noticeable reductions in Fasting and Postprandial Blood Glucose were observed.

Weight, BMI, abdominal circumference, and skin fold thickness underwent marked changes, significantly influenced by the interventions, diet and exercises (Tables 5 and 6).

**Table 7: Results**

| Parameters | Pre-Treatment (July 2022) (1st day) | Second-follow up (September2022) (60th day) | Post-Treatment (October 2023) (380th day) |
|---|---|---|---|
| HbA1C | 6.47 % | 5.6 % | 5.5 % |
| Blood pressure | 140/90 mm Hg | 130/90 mm Hg | 130/80 mm Hg |
| BMI | 23.2 kg/m$^2$ | 23.2 kg/m$^2$ | 23.1 kg/m$^2$ |
| Skin fold thickness | 20 mm | 20 mm | 19.5 mm |
| Abdominal circumference | 80.5 cm | 80.5 cm | 80 cm |
| Mid arm circumference | 28 cm | 28 cm | 28 cm |
| Lipid profile | Within normal limit | Within normal limit | Within normal limit |

Prameha, a metabolic disorder, arises from lifestyle factors, including poor dietary habits, irregular sleep patterns, and chronic stress, leading to an imbalance in the body's biological systems and disrupted digestive capacity. This imbalance impairs the functional potential of various bodily systems, culminating in metabolic disturbances, including pre-diabetes. The pathogenesis of Prameha involves suppressed beta-cell activity in the Islets of Langerhans, disrupted gut-brain-islets axis, impaired intestinal digestion and metabolism, accumulation of toxic materials, correction of gut function, digestion, metabolism, and detoxification can rectify these imbalances. Specifically, Prameha's development is characterized by mandagni (imbalanced digestive fire), medodhatvagni mandya (impaired fat metabolism), leading to glucose conversion issues, elevated blood sugar levels, increased kleda (excessive fluidity), bahudrava shleshma (Kapha imbalance), and abadha meda (elevated bad cholesterol and triglycerides). Progressive vitiation of Pitta dosha leads to neuropathic complications, such as burning sensations in the feet, while vitiated Vata dosha contributes to radiculopathy and other disorders.

**Shamanoushadhis**
The tablet contains Meshashringi, Bijaka, Jambu, Amalaki, Karavella, and Haridra extracts. This formulation stimulates digestive enzymes (Agni) through Jambu's laghu, ruksha, and tikta characteristics. Amalaki-driven laxative properties enhance gastrointestinal cleansing and modulate the gut-brain-islets axis, promoting metabolic balance. Reduces Kleda in the body due to ingredients Karavella and Haridra, which have ruksha, laghu guna and kashaya rasa. [8,9]

The tablet contains Malkanganibeeja, Shankhapushpi, Brahmi, Abhraka bhasma, Ashwagandha, effectiveness in enhancing the memory and promoting the alertness, ingredients hold strong sedative traits that positively influence an agitated brain, mind and central nervous system.

**C.Ksheerabala 101**
It contains Tila taila, Bala, and Goksheera; most of these components exhibit properties that nourish the Sleshaka Kapha, stimulate the sensory nerve endings and strengthen the muscles.[10]

**Ayaskruthi**
This formulation is composed of several key ingredients, including Asana, Tinisha, Bhurja, Arjuna Prakirya, Latakaranja Khadira, Meshasrungi, Shinshapa Rakta chandana, Daru haridra, Tala etc. It has Kapha medohara, tikta, kasaya, katu, rasa usna veerya, laghu, ruksa guna, and katu vipaka. As a result, it will contribute to converting glucose into glucagon. [11]

**Manasamithra Vatakam**
This formulation is composed of several key ingredients, including Bala, Nagabala, Bilva, Prishniparni, Pravalapishti, Tamrachuda Padika, Mrigashringa Bhasma, Stanya, Pushkaramoola, and Vacha. This herb, when used as an anti-stress agent, has shown antioxidant, immunomodulator, hepato-protective, antidepressant, and anxiolytic effects. [12]

**Ksheera Bala Tailam**
It contains Tila taila, Bala, Goksheera*;* it suppresses nerve inflammation due to its sheeta property and, promotes nerve regeneration and gives strength to muscles due to its balya and brimhana properties. [13]

**Anuloma DS**
It contains Ajamoda, Jeeraka, Haritaki, Yasthimadhu, Shundi and saindava lavana. It is digestive, anti-flatulent and carminative in action. [14]

**Twaqure cream**
This formulation comprises several key ingredients, including Aragwadha, Bakuchi, Khadira, and Sarsapa taila. It protects the skin from microbial infections and allergic conditions.

**Probable mode of action of Lifestyle Modification**

Drinking lukewarm water helps dissolve excess fat, aids weight loss, and improves digestion while balancing Kapha and related elements like Kleda. Certain grains, such as barley, bajra, maize, and ragi, absorb and reduce excess fat due to their ruksha (rough) properties. Maintaining a regular schedule for food and sleep helps regulate the body's biochemical balance. Exercise comprehensively impacts overall health, enhancing muscle activity and strength, endurance and flexibility, balance and coordination. Regular physical activity yields numerous benefits, including healthy weight management, reduced adiposity, improved lipid profiles, stable glycemic levels, and enhanced insulin sensitivity.[15]

## CONCLUSION

Pre-diabetes management should be multifaceted, including lifestyle and diet modifications, physical activity, psychological support and pharmacotherapy as appropriate. The current study

revealed clinically significant improvements in symptoms, a substantial decrease in HbA1C (reversing pre-diabetes to normal), noticeable reductions in Fasting and Postprandial Glucose levels, marked improvements in anthropometric measurements: weight, BMI, abdominal circumference, skin fold thickness significantly influenced by the interventions, diet and exercises.

**Declaration of Patient Consent:** Authors certify that they have obtained the patient consent form, where the patient has given his consent for reporting the case along with the clinical information in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

**Patient Perspective:** The patient reported experiencing relaxation and an overall improvement in the quality of life and symptoms after receiving Ayurvedic medications and lifestyle modifications.

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**REFERENCES**

1. Arundatta, Hemadri. Vagbhata Ashtanga Hridaya. Ayurveda Rasayana Tika. Nidana Sthana. Varanasi: Chaukhamba Surbharati Prakashan; Pramehanidana Chapter 10, Verse 7, 2017. p. 502.
2. Bansal N. Prediabetes diagnosis and treatment: A review. World J Diabetes [Internet]. 2015 Mar 15 [cited 2024 Aug 14];6(2):296-303. DOI: 10.4239/wjd.v6.i2.296. PMID: 25789110. PMCID: PMC4360422.
3. Trikamaji Yadavji (editor). Sushruta Samhita of Sushruta. Nidana Sthana, Pramehanidana. Varanasi: Chaukhamba Surbharati Prakashan; Chapter 6, Verse 27, 2018. p. 294.
4. Marín-Peñalver JJ, Martín-Timon I, Sevillano-Collantes C, Del Cañizo-Gomez FJ. Update on the treatment of type 2 diabetes mellitus. World J Diabetes [Internet]. 2016 Sep 15 [cited 2024 Aug 14];7(17):354-95. DOI: 10.4239/wjd.v7.i17.354. PMID: 27679843.
5. Eswaran HT, Kavita MB, Tripaty TB, Shivakumar. Formation and validation of a questionnaire to assess Jatharagni. Anc Sci Life [Internet]. 2015 Apr-Jun [cited 2024 Aug 15];34(4):203-9. DOI: 10.4103/0257-7941.162449. PMID: 26166969.
6. Kashinnath P, Gorakhnath C (editors). Charaka Samhita of Acharya Charaka and Dhrudhabala, with Chakrapani Tika. Nidana Sthana, Pramehadhyaya. Varanasi: Chaukhamba Sanskrit Series Office; Chapter 4, Verse 6, 2013. p. 212.
7. Mohan V, Anbalagan VP. Expanding role of the Madras Diabetes Research Foundation - Indian Diabetes Risk Score in clinical practice. Indian J Endocrinol Metab [Internet]. 2013 Jan [cited 2023 Sep 20];17(1):31-6. DOI: 10.4103/2230-8210.107825. PMID: 23776850. PMCID: PMC3659903.
8. Sable Kundan Dattatraya, Sable Kiran Dattatray, Kathwate Ganesh Sunil, Mane Snehal Suryakant. Formulation and Evaluation of Herbal Antidiabetic Tablet. Asian J Res Pharm Sci [Internet]. 2020 [cited 2024 Aug 12];10(3):145-8. DOI: 10.5958/2231-5659.2020.00027.2.
9. Islam M, Ramanjaneyulu J, Veeresh Babu D, Hoque M, Narayana Swamy VB. Studies on Memory Enhancing Property of Bravobol - A Polyherbal Formulation in Experimentally Induced Alzheimer's Disease in Experimental Animals. Asian J Res Pharm Sci [Internet]. 2015 [cited 2024 Aug 12];5(2):103-10. DOI: 10.5958/2231-5659.2015.00017.X.
10. Rejitha S, Prathibha P, Madambath I. The Ayurvedic drug Ksheerabala (101) ameliorates alcohol-induced neurotoxicity by down-regulating the expression of transcription factor (NFkB) in rat brain. Ayu [Internet]. 2015[cited2023Sep25];36(3):323-8. DOI: 10.4103/0974-8520.182749. PMID:27313421.PMCID: PMC4895761.
11. Bhutada RB. A contemporary critical review of Ayaskruti. World J Pharm Med Res [Internet]. 2022 [cited 2024 Aug 12];8(2):224-5.
12. Tubaki BR, Chandrashekar CR, Sudhakar D, Prabha TN, Lavekar GS, Kutty BM. Clinical efficacy of Manasamitra Vataka (an Ayurveda medication) on generalized anxiety disorder with comorbid generalized social phobia: A randomized controlled study. J Altern Complement Med [Internet]. 2012 Jun [cited 2024 Aug 12];18(6):612-21. DOI: 10.1089/acm.2010.0778. PMID: 22784349.
13. Swathy SS, Indira M. The Ayurvedic drug Ksheerabala, ameliorates quinolinic acid-induced oxidative stress in rat brain. Int J Ayurveda Res [Internet]. 2010 [cited 2024 Aug 12];1(1):4-9. DOI: 10.4103/0974-7788.59936. PMID: 20532090. PMCID: PMC2876928.
14. Varuni BG. An Open-labeled Clinical Study to Evaluate the Safety and Efficacy of "Anuloma DS" in Improving Constipation. Indian J Clin Pract [Internet]. 2023 [cited 2024 Aug 12];34(2):15-22. DOI: 10.59793/ijcp.v34i2.454.
15. Raveendran AV, Deshpandae A, Joshi SR. Therapeutic role of yoga in type 2 diabetes. Endocrinol Metab (Seoul) [Internet]. 2018 Sep [cited 2024 Aug 12];33(3):307-17.

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