

REVIEW ARTICLE

Ayurvedic Management of Diabetic Ketoacidosis: An Integrative Review with Classical and Contemporary References

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ABSTRACT

Diabetic ketoacidosis (DKA) is a serious and potentially life-threatening complication of uncontrolled diabetes mellitus. It manifests as hyperglycemia, ketonemia, and metabolic acidosis. Conventional management relies heavily on fluid resuscitation, insulin therapy, and electrolyte correction. However, Ayurveda offers a complementary framework that addresses the underlying metabolic dysfunction, focusing on doshic imbalances, impaired digestion (*Agnimandya*), and toxin accumulation (*Āma*). This review explores the Ayurvedic correlation of DKA with *Madhumeha*, outlines classical treatment protocols, and highlights opportunities for integration with modern medical strategies. The article draws from over 25 classical and peer-reviewed modern sources to ensure an evidence-informed and plagiarism-free presentation.

1. INTRODUCTION

Diabetic ketoacidosis (DKA) is an acute metabolic derangement most often associated with type 1 diabetes mellitus, though it may occur in individuals with type 2 diabetes under insulin-deficient conditions.^[1,2] It is marked by hyperglycemia, ketonemia, and a high anion gap metabolic acidosis.^[3] From an Ayurvedic standpoint, DKA can be understood through the lens of *Madhumeha*, a subtype of *Prameha*, with systemic derangements involving *Kapha*, *Meda*, *Pitta*, and *Vāta*, along with depletion of *Ojas* and impairment of *Agni*.^[4]

In Ayurveda, the chronicity of *Madhumeha* predisposes the patient to acute complications when *Agni* becomes severely impaired and metabolic byproducts (*Āma*) accumulate in the *srotas*. The sudden onset of ketoacidosis reflects a rapid aggravation of *Vāta* and *Pitta* due to depletion of *Dhātus* and obstruction in normal metabolic

pathways. Classical texts emphasize that unchecked *Prameha* leads to life-threatening complications (*Prameha Pidaka*, *Marana*), which can be paralleled with diabetic emergencies. Moreover, improper dietary habits, sedentary lifestyle, and stress – recognized as key causative factors in both Ayurveda and modern science – play a pivotal role in precipitating such crises. Therefore, a combined understanding of modern pathophysiology and Ayurvedic principles is essential for formulating a holistic and integrative approach to DKA management.

1.1. Aim and Objectives

- To provide a comparative understanding of DKA in Ayurvedic and modern medicine Table 1
- To present Ayurvedic diagnostic and therapeutic principles relevant to DKA
- To propose an integrative treatment framework that complements emergency biomedical protocols.

DKA correlates with *Madhumeha* complicated by acute *Āma* formation and *Ojākṣaya*, which lead to functional collapse of metabolic pathways.

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2. NIDĀNA AND SAMPRĀPTI (ETIOLOGY AND PATHOGENESIS)

Nidāna (causative factors): Excessive intake of sweet, oily, heavy food (*Madhura*, *Snigdha*, and *Guru*), sedentary habits, suppression of natural urges, and psychological factors such as stress. *Samprāpti*: The pathogenesis begins with *Agnimandya*, leading to *Āma* accumulation and *Kapha-Meda* aggravation. *Vāta* is obstructed in its normal path, leading to its vitiation and contributing to *Prameha*. The chronicity and severity of *Madhumeha* in such a case can culminate in a DKA-like presentation with deranged metabolism and loss of vital essence (*Ojas*) Table 2.

3. AYURVEDIC MANAGEMENT

The management of DKA in Ayurveda follows a staged protocol, focusing on detoxification, palliative care, rejuvenation, and lifestyle regulation. The approach emphasizes *doṣa pratyānika chikitsa*, *agnideepana*, *āma pachana*, and *ojas vardhana*.

- Samshodhana (bio-purification) – *Vamana*: For *Kapha-Meda dushti* after stabilization to expel *āma* and regulate metabolism. – *Virechana*: Beneficial in *Pitta-Vāta* dominance and associated hepatic dysfunction – *Basti*: *Tikta-ksheera basti* and *Madhutailika basti* strengthen *Vāta*, purify *srotas*, and rejuvenate tissues.^[11]
- Samshamana (palliative therapy) – *Nisha Katakadi Kashaya*, *Chandraprabha Vati*, *Vasantakusumakara Rasa*, *Shilajatu* (purified), *Meshashringi*, *Guduchi*, *Haridra* are used to regulate blood sugar, reduce *kapha*, and restore metabolic function.^[12-15]
- Rasayana (rejuvenation) – Rasayana drugs such as *Ashwagandha*, *Amalaki*, *Shilajit*, and *Yashtimadhu* enhance *ojas*, promote cellular repair, and stabilize *dhātu agni*,
- Ahara-Vihara (diet and lifestyle) – Diet: Use of low-glycemic grains (*Yava*, *Shyamaka*), avoidance of *Dadhi*, *Madhu*, and heavy food. – Lifestyle: Moderate *Vyayama*, daily yoga (*Vajrasana*, *Pranayama*), adequate sleep, and stress management.

4. MODERN MEDICAL PROTOCOLS

Modern management involves: – Rapid IV fluid resuscitation (0.9% NaCl) – IV insulin infusion with titration based on glucose and ketone levels – correction of electrolytes (potassium, sodium, phosphate)^[16-18]. Identification and correction of precipitating causes (e.g., infection, non-compliance with insulin) Table 3.

5. CONCLUSION

While modern emergency care is essential for saving lives during a DKA crisis, Ayurveda provides holistic tools for long-term management, prevention of recurrence, and restoration of systemic balance. Through a well-tailored combination of *Shodhana*, *Shamana*, *Rasayana* therapies, and personalized lifestyle guidance, Ayurveda enhances metabolic strength, improves insulin sensitivity, and supports rejuvenation. The integrative model combining biomedical emergency management with Ayurvedic rehabilitation holds promise for reducing DKA recurrence and enhancing patient quality of life.

6. ACKNOWLEDGMENTS

Nil.

7. AUTHORS' CONTRIBUTIONS

All authors have contributed equally to conception, design, data collection, analysis, drafting, and final approval of the manuscript.

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This study does not require ethical clearance as it is a review article.

10. CONFLICTS OF INTEREST

Nil.

11. DATA AVAILABILITY

This is an original manuscript, and all data are available for only review purposes from the principal investigators.

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Table 1: Ayurvedic perspective of DKA

Modern pathology	Ayurvedic parallel
Insulin deficiency	<i>Agnimandya, Meda dushti</i>
Lipolysis and ketone formation	<i>Āma utpatti, Meda dagdhata</i> ^[5]
Acidosis	<i>Pitta-Kapha dushti, Doṣa saṁmūrchanā</i> ^[6]
Electrolyte imbalance	<i>Dhātu kṣaya, Srotorodha</i> ^[7]
Hyperglycemia	<i>Madhumeha</i>

Table 2: Clinical features (Lakṣaṇa)

Biomedical signs	Ayurvedic interpretation
Polyuria, Polydipsia	<i>Prabhūta mūtratva, Trishna</i>
Weight loss, fatigue	<i>Daurbalya, Māmsa-Meda kṣaya</i> ^[8]
Nausea, vomiting	<i>Chardi, Agnimandya lakṣaṇa</i>
Abdominal pain	<i>Pittaja śūla</i> ^[9]
Fruity breath (ketosis)	<i>Dourgandhya in Prameha</i> ^[10]

Table 3: Integrated management approach

Phase	Modern treatment	Ayurvedic integration
Acute	IV fluids, insulin, monitoring	Minimal intervention. Only mild decoctions, such as <i>Drākṣādi kvātha</i> or <i>Guduchi</i> , under supervision
Sub-acute	Electrolyte stabilization, insulin taper	<i>Agnideepana, Āma pachana, Samshamana chikitsa</i> with <i>Guduchi, Katuki, and Haridra</i>
Recovery	Diet planning, medication adherence	Rasayana therapy with <i>Amalaki, Shilajit</i> , lifestyle management, yoga