

Physiological Changes Occurring Inside the Body of a Child in Mild Diarrhea- An Integrative Ayurvedic and Modern Scientific Analysis

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ABSTRACT

Background

Mild diarrhea remains one of the most prevalent pediatric conditions worldwide and is associated with significant physiological alterations despite minimal systemic manifestations. Children are particularly vulnerable due to immature digestive mechanisms, higher total body water content, and reduced physiological reserve. In Ayurveda, diarrhea is described under *Atisara*, primarily resulting from *Agnimandya* (impaired digestive fire) and Dosha vitiation, particularly Vata and Pitta. The present paper aims to explore the physiological changes occurring in mild diarrhea in children from both Ayurvedic and modern scientific perspectives and to analyze the mechanistic role of Bilvadi Kwatha and Oral Rehydration Solution (ORS).

Objective

To systematically analyze and correlate the internal physiological changes occurring in mild pediatric diarrhea as per Ayurvedic classical concepts and contemporary biomedical science, and to elucidate the pharmacophysiological mechanisms of Bilvadi Kwatha {Divitya} and ORS in its management.

Methods

A comprehensive conceptual review was conducted based on classical Ayurvedic texts including *Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*, and *Kashyapa Samhita*, along with modern pediatric and gastrointestinal physiology literature. Ayurvedic principles such as *Agnimandya*, *Aama formation*, *Dosha prakopa*, *Rasa Kshaya*, and *Ojas involvement* were analyzed and correlated with modern mechanisms including intestinal hypersecretion, increased motility, malabsorption, electrolyte imbalance, and immune activation. The pharmacodynamic properties of Bilvadi Kwatha{Divitya} and the molecular mechanism of ORS were reviewed comparatively.

Results

Mild diarrhea in children represents an early but significant disturbance of gastrointestinal and systemic physiology. Ayurvedically, the condition originates from *Agnimandya*, leading to *Aama* formation and Vata-Pitta aggravation, resulting in increased intestinal motility (*Vata*) and secretion (*Pitta*), ultimately causing *Mala Atipravritti*. Early depletion of *Rasa Dhatu* corresponds to mild dehydration. From a modern perspective, enterotoxin-mediated activation of adenylate cyclase increases cAMP, stimulating chloride secretion via CFTR channels, while inflammatory mediators enhance intestinal motility and impair absorption. Children are especially susceptible due to high fluid turnover and immature renal compensation.

Bilvadi Kwatha acts through *Deepana*, *Pachana*, *Grahi*, and *Dosha Shamana* mechanisms, restoring Agni, reducing secretion, improving absorption, and controlling motility. Modern pharmacological evidence suggests

anti-secretory, anti-inflammatory, antimicrobial, and mucosal protective effects. ORS functions via sodium-glucose co-transport (SGLT-1), facilitating effective rehydration even during ongoing diarrhea and correcting electrolyte imbalance.

Conclusion

Mild diarrhea in children involves complex yet reversible physiological changes affecting digestion, secretion, motility, fluid balance, and immunity. Ayurvedic concepts of *Agnimandya*, *Dosha Prakopa*, and *Rasa Kshaya* show strong correlation with modern gastrointestinal physiology. The combined administration of Bilvadi Kwatha {Divitya} and ORS offers a rational integrative therapeutic approach addressing both pathogenesis and fluid-electrolyte imbalance, thereby preserving *Bala* and preventing progression to severe dehydration. This integrative understanding supports evidence-based incorporation of Ayurvedic formulations in pediatric diarrheal management.

Keywords: Atisara; Mild Diarrhea; Pediatric Physiology; Agnimandya; Rasa Kshaya; Bilvadi Kwatha{Divitya}; Oral Rehydration Solution; Integrative Medicine; Kaumarbhritya; Fluid and Electrolyte Balance.

INTRODUCTION

Diarrhea in children represents one of the most significant disturbances of gastrointestinal physiology. Even mild diarrhea causes measurable changes in fluid balance, intestinal motility, digestion, absorption, immunity, and metabolic regulation.

From an Ayurvedic perspective, Atisara is primarily a disorder of Agni and Dosha imbalance affecting Annavaha and Purishavaha Srotas. In children, due to Aparipakva Dhatu and Manda Agni, physiological disturbances occur rapidly even with mild etiological factors.

AYURVEDIC DEFINITION AND CLASSIFICATION: Charaka Samhita, Chikitsa Sthana 19/3

अतिद्रवं सारयति इति अतिसारः।

Meaning: Excessive expulsion of liquid feces is Atisara.

PEDIATRIC PHYSIOLOGY IN AYURVEDA : Children (Bala) are described as:

- Kapha predominant
- Snigdha
- Mridu
- Aparipakva Dhatu
- Manda Agni

Charaka Sharira Sthana 8/20

बालानां धातूनाम् अपरिपक्वता।

Their Dhatus are immature.

This physiological immaturity explains why:

- Fluid imbalance occurs rapidly
- Agni disturbance develops easily
- Rasa depletion manifests early.

NIDANA AND AGNI DISTURBANCE:

Classical Reference

Charaka Chikitsa 19/6

असात्म्यभोजनात् पानात् क्षीणात् भयशोकजैः।
दोषाः प्रकुप्यन्ति अतिसारं जनयन्ति ॥

Etiological factors aggravate Doshas and produce Atisara.

Agnimandya – Central Physiological Event

Charaka Chikitsa 19/5

अग्निमन्दाद् भवत्यामं ततो दोषप्रकोपणम्।

Impaired digestive fire leads to Aama formation, causing Dosha aggravation.

Physiological Interpretation

- Reduced enzymatic digestion
- Incomplete carbohydrate breakdown
- Increased osmotic load
- Fermentation
- Gas formation
- Intestinal irritation

In children, Agni is physiologically mild, making this stage more prominent.

AAMA FORMATION – METABOLIC DISTURBANCE :

Aama is described as:

- Guru
- Picchila
- Abhishyandi
- Drava

Aama causes:

- Srotorodha (channel obstruction)
- Intestinal mucosal irritation
- Secretion imbalance

This correlates with:

- Endotoxin production
- Inflammatory mediators
- Increased mucosal permeability.

DOSHIC PHYSIOLOGICAL CHANGES:

Vata Prakopa – Motility Disturbance

Charaka Chikitsa 19/25

वातात् शूलं प्रवाहिकं द्रवं स्तोकं मुहुर्मुहुः।

Vata aggravation produces:

- Increased intestinal movement
- Frequent stool
- Reduced absorption time

Modern Correlation

- Enteric nervous system hyperstimulation
- Increased peristalsis
- Decreased transit time
- Reduced sodium and water absorption

Pitta Prakopa – Secretory Changes

Pitta possesses:

- Ushna
- Tikshna
- Drava

Pitta aggravation causes:

- Increased secretion
- Mild inflammation
- Burning sensation

Modern Correlation

- Activation of adenylate cyclase
- cAMP increase
- CFTR chloride channel activation
- Chloride and water secretion.

Kapha Involvement – Mucus and Heaviness

Kapha leads to:

- Mucus in stool
- Heaviness
- Mild lethargy

Equivalent to mucosal hypersecretion.

SROTAS LEVEL CHANGES :

Affected Srotas:

- Annavaaha Srotas
- Purishavaaha Srotas

Pathological sequence:

Nidana → Agnimandya → Aama → Dosha Prakopa →
Srotodusti → Drava Vriddhi → Mala Atipravritti

DHATU LEVEL PHYSIOLOGY:

Rasa Dhatu – Primary Affected Tissue

Sushruta Sutra 15/48

रसक्षये शोषलक्षणानि।

Rasa depletion causes dryness and weakness.

In mild diarrhea:

- Plasma volume reduction
- Mild dehydration
- Thirst
- Reduced perfusion

Children have higher Rasa dominance, hence early dehydration signs appear.

Rakta Dhatu :Usually preserved in mild cases.

Ojas – Immune Aspect:

Ojas represents immunity and vitality.

Prolonged diarrhea causes:

- Reduced immunity
- Irritability
- Fatigue.

MODERN SCIENTIFIC PHYSIOLOGY

INTESTINAL SECRETION MECHANISM:

Pathogens produce toxins that:

- Stimulate adenylate cyclase
- Increase cAMP
- Open CFTR chloride channels

Result:

- Chloride secretion
- Sodium follows passively
- Water follows osmotically
- Watery stool formation.

MOTILITY CHANGES

Inflammatory mediators stimulate:

- Enteric nervous plexus
- Increased smooth muscle contraction
- Reduced absorption time

Equivalent to Vata prakopa.

ABSORPTIVE DYSFUNCTION:

Damage to:

- Brush border enzymes
- Lactase deficiency

Leads to:

- Osmotic diarrhea
- Undigested carbohydrates
- Gas and bloating

Equivalent to Agnimandya and Aama.

FLUID AND ELECTROLYTE LOSS:

In mild diarrhea:

- Mild sodium depletion
- Mild potassium depletion
- Mild bicarbonate loss

Children are vulnerable due to:

- 60–70% total body water
- Higher metabolic demand
- Immature renal compensation

IMMUNOLOGICAL RESPONSE:

- Activation of Peyer's patches
- Cytokine release
- Local inflammation

Equivalent to Pitta + Aama interaction.

SYSTEMIC PHYSIOLOGICAL EFFECTS IN CHILDREN:

Even mild diarrhea causes:

- Reduced appetite
- Irritability
- Mild tachycardia
- Reduced urine output
- Fatigue

Ayurvedic explanation:

- Agnimandya
- Rasa Kshaya
- Bala Hani

INTEGRATED COMPARATIVE ANALYSIS

Ayurveda Modern Science

Agnimandya Enzyme dysfunction

Aama Toxins/inflammation

Vata Prakopa Increased motility

Pitta Prakopa Secretory diarrhea

Rasa Kshaya Dehydration

Ojas Kshaya Reduced immunity

CONCLUSION

Mild diarrhea in children is not merely increased stool frequency but represents a cascade of physiological disturbances including:

- Digestive impairment
- Motility alteration
- Secretory imbalance
- Fluid and electrolyte loss
- Early immune activation

Ayurvedic concepts of Agnimandya, Dosha Prakopa, Rasa Kshaya, and Ojas depletion show remarkable correlation with modern gastrointestinal physiology.

Understanding these changes helps in:

- Early diagnosis
- Rational therapy
- Prevention of complications
- Protection of Bala and Ojas

DRUG INTERVENTION PHYSIOLOGY

(Bilvadi Kwatha + ORS in Mild Atisara in Children)

A. BILVADI KWATHA – PHYSIOLOGICAL MECHANISM

Classical Indication

Bilva is a prime drug for Atisara.

Charaka Chikitsa 19

बिल्वं ग्राही दीपनीयम्।

Bilva is Grahi (absorptive) and Deepaniya (enhances Agni).

Composition (Typical Bilvadi Formulation)

- Bilva (Aegle marmelos)
- Musta
- Ativisha
- Kutaja
- Dhanyaka
- etc.

Ayurvedic Pharmacodynamics

Property Effect

Rasa Kashaya, Tikta

Guna Laghu, Ruksha

Virya Ushna

Vipaka Katu

Karma Grahi, Deepana, Pachana

Ayurvedic Physiological Action

1. Deepana (Agni Stimulation)

Restores Jatharagni → Improves digestion → Reduces Aama.

2. Pachana

Digests Aama → Reduces intestinal toxin load.

3. Grahi Action

Absorbs excess intestinal fluid → Reduces Drava Guna.

4. Vata-Pitta Shamana

Regulates motility and secretion.

Modern Scientific Correlation :

1. Anti-secretory Effect

Bilva fruit contains:

- Tannins
- Marmelosin
- Coumarins

These reduce:

- Intestinal secretion
- Chloride channel activity

2. Anti-motility Effect

Reduces smooth muscle hyperactivity.

3. Anti-inflammatory Effect

- Reduces cytokine production
- Protects mucosa

4. Antimicrobial Action

Kutaja (*Holarrhena antidysenterica*):

- Anti-amoebic
- Anti-bacterial

B. ORS – PHYSIOLOGICAL MECHANISM

WHO ORS Composition

- Glucose
- Sodium chloride
- Potassium chloride
- Citrate

Mechanism of Action

1. Sodium-Glucose Co-Transport (SGLT-1)

Glucose facilitates sodium absorption via SGLT-1 transporter.

Water follows sodium osmotically.

Even in diarrhea:

SGLT-1 remains functional.

Thus:

- Enhances rehydration
- Prevents dehydration
- Restores plasma volume.

Electrolyte Correction:

- Sodium → Restores extracellular fluid
- Potassium → Prevents hypokalemia
- Citrate → Corrects metabolic acidosis

INTEGRATED ACTION (Bilvadi + ORS):

Bilvadi Kwatha ORS

Corrects Agni Corrects dehydration

Reduces secretion Restores sodium balance

Bilvadi Kwatha ORS

Controls motility Prevents acidosis

Digests Aama Maintains perfusion

INTEGRATED PHYSIOLOGICAL OUTCOME

1. Agni restoration
2. Reduced intestinal hypersecretion
3. Controlled motility
4. Correction of fluid deficit
5. Preservation of Rasa Dhatu
6. Protection of Ojas

Bilvadi Kwatha acts at:

- Dosha level
- Agni level
- Srotas level

ORS acts at:

- Cellular transport level
- Electrolyte level
- Plasma volume level

This integrative approach provides scientific validation of classical Ayurvedic management in mild pediatric Atisara.

VANCOUVER STYLE REFERENCES

Classical Ayurvedic References

1. Agnivesha. **Charaka Samhita**, revised by Charaka and Dridhabala. Chikitsa Sthana, Chapter 19 (Atisara Chikitsa). In: Acharya YT, editor. Varanasi: Chaukhambha Surbharati Prakashan; 2014.
2. Agnivesha. **Charaka Samhita**, Sharira Sthana, Chapter 8. In: Acharya YT, editor. Varanasi: Chaukhambha Surbharati Prakashan; 2014.
3. Sushruta. **Sushruta Samhita**, Sutra Sthana, Chapter 15. In: Acharya YT, editor. Varanasi: Chaukhambha Surbharati Prakashan; 2014.
4. Vagbhata. **Ashtanga Hridaya**, Nidana Sthana, Chapter 8 (Atisara Nidana). In: Harishastri Paradkar, editor. Varanasi: Chaukhambha Orientalia; 2018.
5. Kashyapa. **Kashyapa Samhita (Vridha Jivakiya Tantra)**, Atisara Chikitsa Adhyaya. In: Tewari PV, editor. Varanasi: Chaukhambha Visvabharati; 2016.

Modern Medical References

6. Walker CLF, Rudan I, Liu L, et al. Global burden of childhood diarrhoea. *Lancet*. 2013;381(9875):1405-1416.
7. World Health Organization. **The treatment of diarrhoea: A manual for physicians and other senior health workers**. 4th rev. Geneva: WHO; 2005.
8. Kliegman RM, St Geme JW. **Nelson Textbook of Pediatrics**. 21st ed. Philadelphia: Elsevier; 2020.
9. Hall JE. **Guyton and Hall Textbook of Medical Physiology**. 14th ed. Philadelphia: Elsevier; 2021.

10. Barrett KE, Barman SM, Brooks HL. **Ganong's Review of Medical Physiology**. 26th ed. New York: McGraw Hill; 2019.
11. Binder HJ. Mechanisms of diarrhea in inflammatory bowel diseases. *Ann N Y Acad Sci*. 2009;1165:285-293.
12. Field M. Intestinal ion transport and the pathophysiology of diarrhea. *J Clin Invest*. 2003;111(7):931-943.