

# Formulation & Evaluation of Polyherbal solution for Prognosis of IgA Vasculitis

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**Abstract:** IgA Vasculitis is a systemic inflammation of small vessels. It is an autoimmune disorder in which IgA antibodies abnormally attack host's body cells, particularly to the blood vessels cell. IgAV is the most common form of vasculitis in children. IgA vasculitis spontaneously resolves in 94% of children and 89% of adults, and that's why making supportive treatment is the primary management strategy. Present study aimed to develop polyherbal formulation for prognosis in IgA vasculitis. In this study, Herbal solution was formulated containing suitable ingredient such as *Asparagus racemosus*, *Zingiber officinale*, *Borago officinalis*, *Withania somnifera* in different proportions to formulate and evaluate its physicochemical properties. Systematic reviews have shown that steroids do not prevent complications and should not be used prophylactically. Herbal drugs used in formulation act by different mechanisms which aim to betterment of life quality diseased patient.

**Keywords:** IgA, Vasculitis, Purpura, HSP, Henoch-Schönlein purpura.

## I. INTRODUCTION

The human body is surrounded by the external environment. The skin is the outermost organ of the human body which is exposed to various environmental factors. Cutaneous immune response acts here to protect the host human body. This self-defense action against the external environment sometimes triggers excessive inflammatory reactions, namely autoimmune reactions. (1). Immunoglobulin A is a member of the human immunoglobulin family (4). It is an essential immune component that drives the host immune response to the external environment (1). IgA vasculitis, formerly known as Henoch-Schönlein purpura, represents the non-granulomatous systemic vasculitis (2). Henoch-Schönlein purpura (HSP) is a systemic vasculitis caused by acute perivascular deposits of IgA and

complement 3 (C3) in small blood vessels (3). It is characterized by inflammation of the blood vessels, which can restrict blood flow and damage vital organs and tissues. HSP is mostly seen in small children.

## II. EPIDEMIOLOGY

90% of cases occur under the age of 10 years. Therefore, seen regularly by pediatricians. In children, it has a slight male predominance (1.5:1 male: female ratio). and adults have higher frequency of joint involvement when compared to children. IgAV can occur in any race and it predominates in certain parts of the world such as Korea and Japan (17).

## III. DIAGNOSIS

IgA vasculitis should be suspected in patients presenting with palpable purpura who also develop arthralgias (75% of patients) and abdominal pain (50% to 65% of patients) (8).

Useful studies include a complete blood count to exclude blood loss and determine the platelet count; a coagulation profile to exclude coagulopathy; electrolytes and renal function tests to exclude renal disease; and a serum albumin test to assess for intestinal protein loss (12). Skin biopsy is needed only in cases where the diagnosis is unclear. The fecal calprotectin level may be a reliable marker for gastrointestinal involvement (13). A renal biopsy should be performed if an IgA vasculitis patient has severe proteinuria (>250 mg/mmol for at least 4 weeks) (14). More recently modified semi-quantitative classification (SQC) scores have been proposed to enhance the sensitivity in predicting the renal outcome in IgAV (15).

Because IgAV can affect all organ systems, a full physical examination is indicated.

#### IV.SYMPTOMS

Signs and symptoms may develop over days to weeks in any sequence(9).

- **Rashes:** It begins with erythematous, macular, or urticarial lesions and progresses to blanching papules and later to palpable purpura. Rashes are seen in about 95-100% of cases. Rashes are seen on back and buttocks, ankles and lower legs, face, trunk, and upper extremities. Rash may be itchy but is rarely painful.



Figure 1: Progression of rash in immunoglobulin A vasculitis - Early stage



Figure 2 :purpura develop over few days.



Figure 3 : Petechiae and purpura at different stages of development

- **Arthritis:** Joint pain and abdominal pain are seen in 50-75% of children. whereas adults are more likely to have lower-extremity edema and hypertension (10). joints of the lower limb. Joints of the feet and ankles being most commonly involved in arthritis followed by knees, wrists, elbows, and hands (12).
- **GI problems:** Emesis and gastrointestinal bleeding can occur in approximately one-third of patients (5). Acute involvement of the GI tract impacts the short-term prognosis of the disease. Emesis and gastrointestinal bleeding can occur in approximately one-third of patients. 30% of patients experience gastrointestinal bleeding (5). Acute involvement of the GI tract impacts the short-term prognosis of the disease. It can extend to include acute GI bleeding. GI bleeding has been linked to the need for a longer hospital admission (16). and in severe cases it warrants acute immunosuppressive treatment

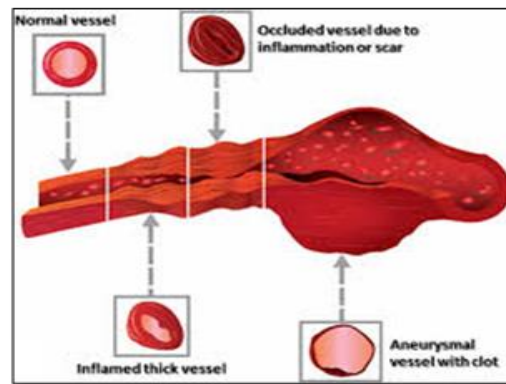


Figure 4: gastrointestinal damage

- **Kidney inflammation:** long-term prognosis depends on the severity of the kidney disease. IgA vasculitis in adult patients showed a high prevalence of IgA nephritis. Renal disease typically develops within one to three months after the rash, but it may be delayed up to six months (11).

#### V.PHYSIOLOGY

Immunoglobulin A (IgA) is the most abundant type of antibody in the body. Physiologically it serves to protect the mucosal tissues from microbial invasion and maintain immune homeostasis. Secretory IgA (SIgA) neutralise or block the activity of a range of viruses, bacteria, and protozoa, and prevent their attachment to host cells.

VI.PATHOPHYSIOLOGY

The mucosal antigen is encountered by dendritic cells. Dendritic cells represent this antigen to Thelper cell. Thelper cells activate B-cells in MALT through T-cell-dependent or independent ways. With genetic factors, the activated B-cells become plasma cells and produce Gd-IgA1. Gd-IgA1 and anti-Gd-IgA1 autoantibodies form circulating immune complexes together with other components (including sCD89 or complements). Then, the immunocomplex deposit at

organs and activate inflammatory responses. In the kidney, the immunocomplex can activate mesangial cells through TfR, leading to the apoptosis of renal cells and recruitment of inflammatory cells.

Symptoms of IgA vasculitis typically last one to two months, and most patients recover on their own without treatment. Therefore, treatment is usually aimed at relieving minor symptoms until they dissipate. For that purpose we have developed a polyherbal solution.

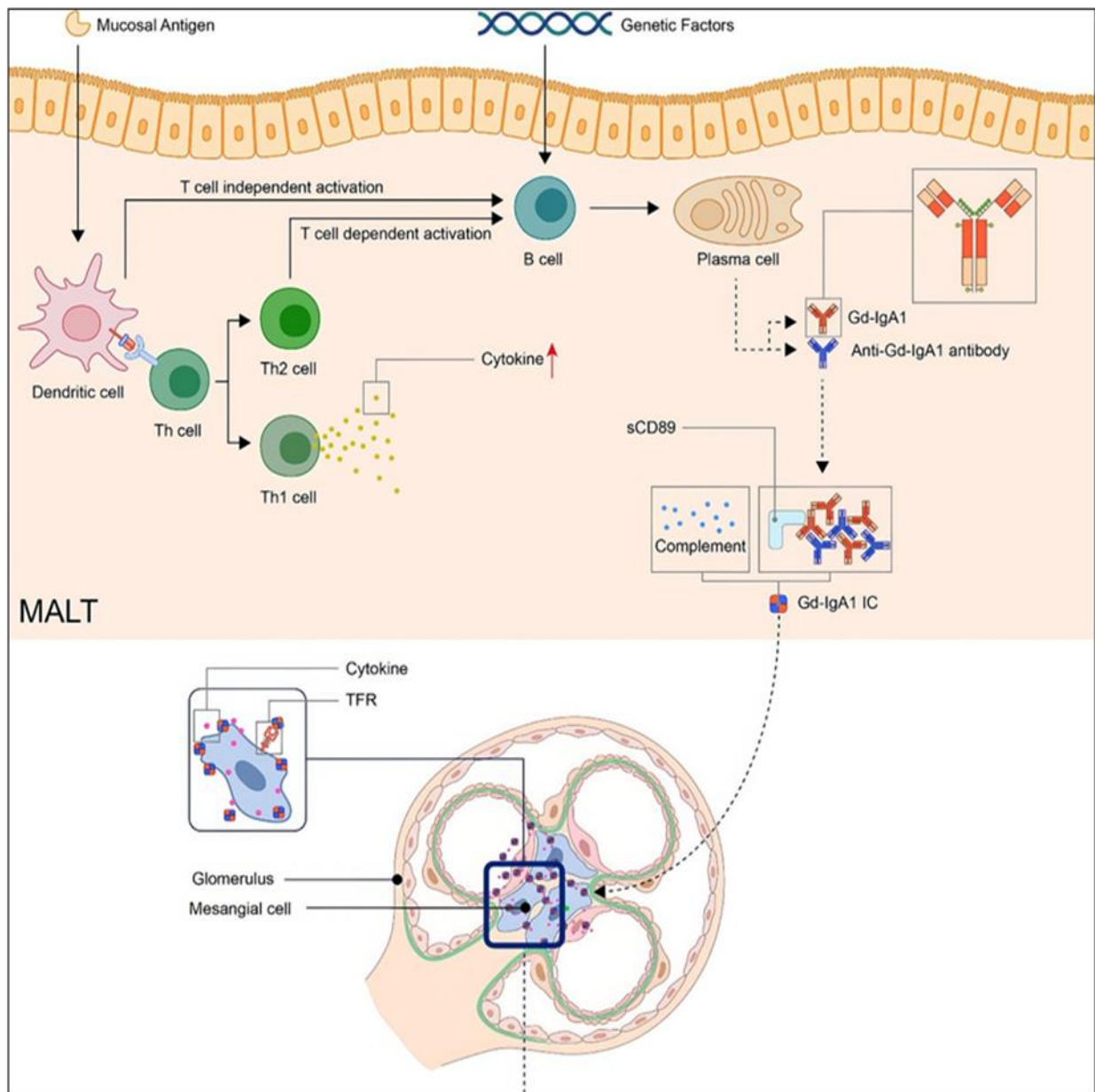


Figure 5. Pathophysiology of IgA Vasculitis.

VII. MATERIAL AND METHODOLOGY

Collection of Crude drugs: Taxonomically identified and authenticated roots of *Asparagus racemosus* (Liliaceae) commonly known as Shatavari(6), Rhizomes of *Zingiber officinale* root (Zingiberaceae), fresh leaves of *Borago officinalis* (Boraginaceae) and Roots of *Withania somnifera* (Solanaceae) known commonly as ashwagandha were purchased from local herbal drug store.

These Crude drugs (Except Borago leaves) were subjected to shed drying. After sufficient drying they were powdered with help of various milling techniques. Ensured the proper milling of each Crude drug.

- *Asparagus racemosus*

Synonym: Satawar, Satamuli, Satavari

Biological source: It is obtained from dried Roots of plant *Asparagus racemosus* belonging to family Asparagaceae

Uses: it is used as immunomodulatory (immunosuppressants) agent.



Figure 6: *Asparagus racemosus*

- *Zingiber officinale*

Synonym: Ginger

Biological source: It is obtained from dried rhizomes (underground stem) of plant *Zingiber officinale* belonging to family Zingiberaceae

uses: it is used as Anti-inflammatory agent.



Figure 7: *Zingiber officinale*

- *Borago officinalis*

Synonym: starflower , ajwain

Biological source: It is obtained from fresh leaves of *Borago officinalis* belonging to family Boraginaceae

uses: it is used as Anti-inflammatory agent.

- *Withania somnifera*

Synonym: ashwagandha, winter cherry



Figure 8: *Borago officinalis*

Biological source: It is obtained from dried Roots of *Withania somnifera* belonging to family Solanaceae

Uses: it is used as Antioxidant, immunosuppressant agent.



Figure 1: *Withania somnifera*

Table 1: Useful pharmacological properties of Herbal drugs.

Drug	Use
<i>Asparagus racemosus</i>	Immunomodulatory
<i>Zingiber officinale</i>	Anti-inflammatory
<i>Borago officinalis</i>	Anti-inflammatory
<i>Withania somnifera</i>	Antioxidant, immunosuppressant
Water	Vehicle

**Preparation of decoction** :5gm of each powdered ingredient was mixed in 200 ml water in Beaker separately. Fresh leaves of borago was taken in beaker along with 200 ml Water. Then they were subjected to heating mantle for boiling. Heating was discontinued once total volume became one fourth part of initial volume. The decoction preparation was then filtered through a muslin cloth followed by filtration with filter paper and kept at 4°C until its use.

**Preparation of polyherbal solution**: Finally polyherbal solution was formulated by mixing individual decoctions as per formula table.

Table 2:Formula table

Drug	Quantity		
	F1	F2	F3
<i>Asparagus racemosus</i>	4	5	2
<i>Zingiber officinale</i>	3	2	3
<i>Borago officinalis</i>	6	3	1
<i>Withania somnifera</i>	2	3	4
Water	5	7	10

### VIII. EVALUATION OF FORMULATION:

#### 1. Colour examination –

- 5ml of prepared Solution was taken on a watch glass.
- Watch glass placed against white background in white tube light.
- Colour was observed by naked eyes.

#### 2. Odour examination –

- 2ml of prepared solution was taken and smelled individually.
- The time interval between 2 smelling was 2 minutes to nullify effect of previous smelling.

#### 3. Taste examination –

A pinch of final solution was taken and examined taste buds of tongue.

#### 4. Transparency Examination-

- Take 5ml Herbal solution in Test Tube.
- Observe herbal solution against Bright white background for colour.

#### 5. pH Determination-

- 10 ml of prepared solution taken in 100 ml of volumetric flask.
- Make up the volume to 100 ml with distilled water
- Sonicate for 10 Min.
- pH was measured by using digital pH meter.

#### 6. Viscosity Determination-

- Placed the viscometer in vertical position on a suitable stand.
- Filled water in dry viscometer up to mark G.
- The time was counted in second for water to flow from mark A to mark B.
- This step was repeated at least 3 times to avoid error.

### IX. RESULT

The Herbal formulation was prepared successfully by admixing the predetermined amount of the aqueous extracts of all the ingredients. Evaluation of polyherbal solution was carried out and result of evaluation study was as follows:

Table 3:Result of Evaluation tests.

Evaluation Test	F1	F2	F3
Colour Examination	Greenish Yellow	Yellowish-Brown	Yellowish-Brown
Odour Examination	Aromatic	Aromatic	Aromatic
Taste Examination	Slightly Bitter	Slightly Bitter	Slightly Bitter
Transparency Examination	Transparent	Transparent	Transparent
pH Determination	6.2	6.0	6.3
Viscosity Determination	0.01323	0.01150	0.01294

### X. CONCLUSION

The present study was carried out with the aim of preparing the polyherbal solution for prognosis of IgA Vasculitis which will provide symptomatic relief from

IgA vasculitis. Herbal solution was formulated using aqueous extracts of various herbal drugs. Present study involves use of *Asparagus racemosus*, *Zingiber officinale*, *Borago officinalis*, *Withania somnifera* instead of synthetic drugs. To evaluate for good product performance of the prepared herbal solution, many tests were performed. The results of the evaluation study of the developed herbal solution revealed a comparable result for quality control test, but further scientific validation is needed for its overall quality

IgA vasculitis is common type of child Vasculitis About one-third of individuals who have IgA vasculitis will experience a relapse. Several studies have evaluated the anti-inflammatory action and therapeutic potential of omega-3 fatty acids in IgA vasculitis and nephritis(1). Recent drug developments and the presence of COVID-19 have revealed that bacterial and viral agents can also trigger IgA vasculitis(1). Effective treatment of IgA vasculitis may require the coordinated efforts and ongoing care of a team of medical providers and specialists. The present study help to develop affective and safe polyherbal solution for enhancing patient life quality. Furthermore, the role of IgA in the development of vasculitis needs to be further explored. An in-depth understanding of how acquired and innate immunity participates in the pathogenesis of IgAV may provide the possibility of targeted treatments.

#### XI. ABBREVIATION

IgA	-Immunoglobulin A.
HSP	-Henoch-Schönlein purpura.
IgAV	-Immunoglobulin A Vasculitis.
COVID-19	-Corona Virus Disease of 2019.
pH	- Potential of Hydrogen.
GI	-Gastro Intestine.
SQC	-Semi Quantitative Assay.
ADCC	-Antibody-Dependent Cell Cytotoxicity.
CDC	-Complement-Dependent Cytotoxicity.
Gd-IgA1	-Galactose-deficient IgA1.
MAC	-Membrane Attack Complex.
MALT	-Mucosa-Associated Lymphoid Tissue.
NET	-Neutrophil Extracellular Traps.
TfR	-Transferrin Receptor.
SIgA	- Secretory IgA.

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#### XIII. CONFLICT OF INTEREST

Authors declare no conflict of interest.

#### XIV. REFERENCE

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