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REVIEW OF GARA VISHA AYURVEDA TOXICOLOGY

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ABSTRACT

Human body has the natural tendency to defend itself by eliciting immune response for the maintenance of health. Immune response is recognizing and destroying the antigens of microorganism by triggering the innate immune components such as activation of T-cell or production of antibodies. Sometimes in the sensitive individuals antigens present in the environment produces altered immune response called hypersensitivity. It is manifested with signs and symptoms that are at times lethal. Hapten-carrier adduct behaves as an allergen and induces hypersensitive reactions. Hapten is a small molecule which combines with a large protein, forming hapten-carrier adduct and evokes immune response. Signs and symptoms often with detrimental effect are also found when the body is afflicted with *Garavisha*

Keywords: Ayurveda, Gara Visha, Antibodies.

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INTRODUCTION

Karl Landsteiner is the pioneer of the concept of hapten. Haptens are small molecules (<1000 D) that combine with large protein to form hapten-carrier adduct. Hapten alone cannot elicit immune response; even the carrier protein by itself may not produce the same. The hapten-protein combination is the hapten-carrier adduct that acts as antigen and binds with specific antibodies or activated T-cell to produce immune reaction. Hapten-carrier adduct some time acts as allergen and their exposure primarily occurs through skin surface, oral route, and respiratory tract. The dietary hapten exposure through processed food and formula milk is common nowadays.[3] Notable example of hapten is urushiol which is absorbed through the skin and undergoes oxidation to produce a reactive molecule quinone (the actual hapten). Quinone reacts with skin protein to form hapten-carrier adduct which acts as toxin. The first exposure of the body to the hapten-carrier adduct causes sensitization and proliferation of the effect or T-cell, while in the subsequent exposure, the activated T-cell generates immune reaction by producing skin blisters.[4]

Concept of hypersensitivity

Under normal circumstances, host defense in proper progressive order culminates in well-controlled immune and inflammatory response that protects him/her from offending antigens. The immune response in some person appears as side effect called hypersensitivity.[5] Hypersensitivity is a symptomatic interaction between host

defense and allergen causing exaggerated and harmful response in the body. Hypersensitivity is frequently known as allergy and reaction ranges from mild to life-threatening. It is mainly of two types, immediate hypersensitivity and delayed hypersensitivity.[6] In immediate hypersensitivity reactions, there is immediate manifestation of symptoms and is mediated by IgE antibody. The antigen binds to IgE antibodies already attached to the mast cell because of previous exposure to the same antigen. The antigen-antibody reaction releases plenty of histamine and other chemicals from mast cell causing vasodilatation and shock along with other symptoms. Delayed hypersensitivity reaction is mediated by T_H 1 helper T-cells (T₄ cell). The reaction results in delayed symptoms. In the first exposure, allergen processed by the macrophage is presented to T₄ cell for its activation. In the second exposure, more activated T₄ cells are formed. T₄ cell secretes many chemicals causing activation of more macrophages that destroy the allergen and at the same time, there are indurations, redness and destruction of healthy tissues in that area. Antigen in the form of allergen introduced for the first time in life in host body is the sensitizing dose and reaction does not occur, but on second exposure, reactions appear.

In the traditional Gell and Coombs system of classification, hypersensitivity reactions are of four types:[7]

- Type I hypersensitivity reaction is IgE antibody reaction. Atopic allergy with genetic predisposition belongs to this category
- Type II hypersensitivity reaction is cyto-toxic reaction
- Type III hypersensitivity reaction is immunocomplex reaction
- Type IV hypersensitivity reaction is delayed reaction mediated by helper T-cell.

The former classification of two types of hypersensitivity reaction (immediate and delayed) is relevant for the present article.

The concept of Visha

The word *Visha* is derived from the root “Vis” by having “Ka” preposition. This means to encompass, pervade, or occupy. The term *Visha* gets its name from *Vishada*. Substance that enters and vitiates the healthy *Dhatu* (structural components, tissues) of the body and may or may not manifest with lethal signs and symptoms is termed as *Visha*.^[8]

Ayurveda describes three varieties of *Visha*, i.e., *Jangama* (animal origin), *Sthavara* (plant and mineral origin) and *Kritrima* (artificial poison).^[9]

The third variety of poison is prepared by the combination of different materials. When it is produced by the combination of two nonpoisonous materials, it is called *Garavisha*; while combination of two poisonous materials forms *Kritrima Visha*.^[10]

The concept of Garavisha

The word *Gara* is derived from root word “Gri” with the suffix “Ac.” This means diluted or reduced in potencies.^[11] *Garavisha* is a combination of two nonpoisonous substances. It slowly produces toxic effect by vitiating the *Dhatu* (structural components of the body). This is followed by manifestation of mild to drastic clinical features. Unlike other poison, it does not cause instantaneous death. *Garavisha* commonly enters the body through food preparations.^[12] By nonpoisonous, it means that each ingredient forming *Garavisha* when enters the body separately does not produce any symptom, but their combination has poisonous effect producing adverse clinical features such as laziness, heaviness of the body, cough, dyspnea and edema that appear after 15 days or 1 month duration of affliction.^[13] There are ten attributes of *Visha*.^[14] These are equally applicable for *Garavisha* but are of *Alpa Virya* (mild intensities).

Garavisha is a combination of two nonpoisonous components (substances) producing signs and symptoms of *Visha* after application or consumption. Hapten-carrier adduct is also a combination of two components, hapten and carrier protein. As a single component hapten or carrier protein does not function as immunogen and cannot elicit immune response.

Single component of *Garavisha* also does not produce *Visha* (toxic) effect. They produce toxic effects on combination. The combining substances

forming *Garavisha* may be of *Viruddha Veerya* (mutually contradictory potencies) obtained from *Viruddha Ahara* and other sources of *Viruddha*. The resultant reaction of two mutually contradictory potencies is adverse for the body and hence, *Garavisha* is a toxin and behaves as an allergen. The hapten and the carrier protein do not produce immunogenic effect separately, but their combination as hapten-carrier adduct makes them bind to the antigen presenting cell for activation of T- and B-cells and produce harmful immune reaction. Hence, *Garavisha* has a striking similarity with the hapten-carrier adduct.

Garavisha like other varieties of *Visha* causes *Vishada* or stressful condition. It is of slow reacting nature and gradually produces toxic effect by vitiating *Dhatu* through formation of *Amadosha* and *Agnimandya*, while exposure to hapten-carrier adduct causes sensitization and proliferation of the effector T-cells and antibodies present in the body, and on subsequent exposure, sometimes, stressful immune response is triggered at the site (tissues) of sensitization by activated memory T-cell and antibodies. The stressful immune response is the adverse effect of body's defensive mechanism and is called hypersensitivity. The reaction of *Garavisha* is likely comparable to hypersensitive response to body's immune mechanism.

In immediate hypersensitivity reaction, response is seen within 12 h of antigen challenge to preformed antibodies. Atopic allergy with genetic predisposition (allergy running in the family) produces immediate

hypersensitive response with symptoms manifesting within few minutes to few hours. Symptoms appear after 2–4 weeks due to *Garavisha* affliction. In Ayurvedic treaties, *Garavisha* poisoning is not included under *Kulaja Vyadhi*. Immediate hypersensitivity reaction along with atopic allergy does not match with the characteristic result of *Garavisha* and so cannot be included under its ambit.

Kalantara Vipaka[28] implies delayed reaction of *Garavisha*. It takes time for such poison to get metabolized and produce toxic effect. This feature is common to delayed hypersensitivity reaction that takes few days to week for the development of symptoms. *Garavisha* is analogous to hapten-carrier adduct that can produce delayed hypersensitivity.

The concept of hapten-carrier adducts and delayed reaction hypersensitivity existed in the Ayurvedic treaties centuries ago and the terms *Garavisha* was applied for it. Clinically, hapten-carrier adduct and *Garavisha* produce more or less same type of clinical manifestation and systemic involvement. This aroused the necessity to relate *Garavisha* with hapten-carrier adduct. Further comprehensive and analytical studies are necessary to establish the concept of *Garavisha* with hapten and hapten-carrier adduct which may open new dimensions to understand the concept of *Garavisha*.

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