NUTRITION IN IMMUNE SYSTEM DYSFUNCTION AND ALLERGY

B.A. PART II (Hons.)
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DEPTT. OF HOME SCIENCE
Topics Covered
(click on the topic to access)

- INTRODUCTION
- TYPES OF IMMUNITY
- NON-SPECIFIC IMMUNITY: PRIMARY DEFENCES
- SPECIFIC IMMUNITY
- NUTRITIONAL DEFICIENCY AND IMMUNE FUNCTION
- IMMUNE SYSTEM DISORDERS
- ALLERGY: RESPIRATORY SYSTEM, ASTHMA, SKIN, DIGESTIVE TRACT
- ALLERGY: (Contd.)
- FOOD ALLERGY DIAGNOSIS AND PATIENT EDUCATION
- SELF-ASSESSMENT

Reference text - Food, Nutrition & Diet Therapy by S.R. Mudambi
• The ability of the body to resist infection is known as **Immunity**.
• Natural Immunity is the sum total of the defense of the body, which enables the body to resist infection under normal conditions.
• This is why we are able to resist the agents of disease to which we are exposed on a daily basis.
• Nutrition is key to healthy immune functions. Balanced diet helps immune systems working optimally.
• Allergy is body's hypersensitivity to external or internal contact with various substances or conditions. Allergy is a reaction triggered when contacted by allergens. Varies from person to person.

Reference text - Food, Nutrition & Diet Therapy by S.R. Mudambi
Types Of Immunity

IMMUNE RESPONSE

PHYSICAL BARRIERS
- Skin
- Mucous Membranes
- Mucus
- Cilia
- Secretions

SYSTEMIC BARRIERS
(THYMUS, SPLEEN, BONE MARROW, LYMPH NODES)

NON-SPECIFIC
- Interferon
- Complement
- Iron Binding Proteins
- Phagocytes

SPECIFIC
- Cell Coordinate T Cells
- Humoral B Cells
- Granulocytes
- Monocytes

Reference: Food, Nutrition & Diet Therapy by S.R. Mudambi

Figure: Types of Immunity
Non – Specific Immunity: Primary Defenses

- Physical Barriers prevent the entry and action of microbial invaders in the body, it consists of – Skin, Mucus membranes, Mucus, Cilia, Secretions.

- The first response to microbial invaders is Non-specific and does not need to recognize the invader (antigen).

- Non-specific category also includes – Interferon, Complement, Phagocytes.

- **Interferon** are the protein formed when cells are exposed to virus.

- **Complement** system is a group of proteins, which interact with each other in a step wise progression to bring about antigen/antibody reactions.

- **Phagocytes** ingest and destroy microorganisms. Phagocytes include granulocytes and macrophages.

- Macrophages ready the antigen so that the T and B Lymphocytes can recognize it.

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Specific Immunity

- Cell-mediated and humoral are two types of specific immunity.
- **Cell-mediated immunity**: Lymphocytes called T-cells are the main agents of cell-mediated immunity.
  - T-cells get activated on contact with antigen. Resistance to fungal and viral infections is due to these.
  - Immuno-repressive drugs are used to suppress the T-cells in organ transplant cases so that T-cells do not reject the organ transplant as they are foreign tissue.
- **Humoral immunity**: Lymphocytes called B-cells. Antigen specific B-cells produce plasma cells
  - These plasma cells in return produce a variety of immunoglobins (antibodies).
  - These antibodies bind the antigen and form a complex. The complex cells are destroyed by interaction with Complement proteins. The destroyed cells are ingested by Macrophages.
Thymus, Spleen, Lymph nodes are the centers of Immune function.

Atrophy occurs during protein-energy malnutrition atrophy occurs, thereby reducing the T-cell numbers and phagocytosis.

In the absence of protective mechanism in malnourished persons, infectious diseases are common.

Energy – It is observed that in animals fed balanced diets with all nutrients, but with moderate restriction in energy, can live longer, have fewer tumors and slow decrease in immunity with age.

Protein – Protein synthesis is an essential pre-requisite of normal immune function. The quality and quantity of protein are both important in immune response. Increased incidence of infections is observed when the diet does not meet the essential amino acid needs of the individual.
Immune System Disorders

- **Auto – Immune diseases**: The body’s immune defenses start attacking the body itself, considering the tissues as foreign bodies.
- In this order antibodies are produced against the bodily tissues itself and these antibodies are responsible for the auto-immune diseases such as Diabetes mellitus, Rheumatoid Arthritis.
- Also, the absence or insufficiency of a component(s) of immune system levels lead to these disorders.
- Moreover, it is also caused by a virus which destroys body’s specific cell-mediated defense systems. This virus is known as the Human Immuno-Deficiency Virus – HIV.
- The disease caused by this virus is called the Acquired Immuno-Deficiency Syndrome (AIDS).
- This disease affects vital body systems (thymus, spleen, lymph nodes, etc.) which leads to variety of infections.
Allergy: Respiratory System, Asthma, Skin and Digestive Tract

- Allergy is the body’s hypersensitivity to certain substances or conditions such as pollen, cold etc.
- The allergic person may have distressing symptoms from what he/she breathes, eats or touches.
- **Respiratory system**: The lining of the nose, windpipe, bronchial tubes are affected by a variety of substances such as pollen, mold spores, house dust, feathers, animal hair, mites, etc.
- **Asthma**: In most cases it is an extension of nasal allergy into bronchial tubes, as the lining of the nose continues into the bronchial tubes. Swelling and excessive secretion causes the bronchial passage to become narrower and filled with mucus. This leads to difficulty in breathing.
- **Skin**: Two types of allergies – Eczema and Hives; Eczema triggers rash and blisters while Hives are temporary swelling starting below the skin surface. There various substances which affects almost everyone like poison ivy, poison oak or sumac. Other substances are dyes, chemicals, detergents, etc.
- **Digestive Tract**: Food is the most common cause of gastrointestinal allergy, affected areas – gullet, stomach or intestines. Certain drugs can also cause allergy. The symptoms vary from mild discomfort (bloating, constipation) to severe abdominal pains. In some cases, it can start from the mouth, throat, etc. and may itch, swell and burn.

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Food Allergy – Diagnosis And Patient Education

• **Diagnosis**: Knowledge of diet history, symptoms and timing, suspected food/substances and family history is required. The cause may be food or other substances. In severe cases medical examination and assistance may be required. Nutritional assessment of can help detect malnutrition also.

• **Patient Education**: Patient’s meal pattern should fit with family patterns. Nutritional adequacy must be achieved. For instance, if one is allergic to citrus fruits, other sources of ascorbic acid must be included in the diet. Patients need to be educated to read food labels and avoid those items which they may have ingredients they are allergic to. Minute amounts of allergen may cause adverse reactions. Hence, it is advisable for patients to wear a medical alert locket indicating the allergen(s) and carry an Epinephrine kit which can give quick relief from during an allergic reaction.
Self-Assessment
(Assess your understanding, try answering these questions)

- What is Immunity? What is the role of Immunity in the body?
- What is Specific & Non-specific immunity?
- What is the effect of nutritional deficiency on the Immune function?
- What are Auto-Immune diseases? Cause and effects?
- What is an allergy? Types of allergies and their allergens? Symptoms?
- What is the role of nutrition in allergy diagnosis?

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Thank You!

Let's eat well and stay healthy!