AUTOIMMUNE DISEASE-REVISITED

Abstract

The illness that caused by the immune mediated attack of own tissue or organ is referred as autoimmune disease. Mostly it was seen in industrialized countries. i.e. reduced exposure to the microorganism due to improved sanitary practices which increases the immune reactivity and cause allergic reaction and autoimmune responses. It affects 5-10% of peoples in Europe and north America. Clinical manifestation differs from one person to another because it affects any site in the body. It results ininflammation of organ which leads to organ death. Patients may face lifetime of debilitating illness and costly treatment. Autoimmune disease affect the thyroid gland, pancreatic cells, adrenal gland, gastrointestinal tract, kidney, liver and neural transmitters. Head ache, blood in stools, fever, joint pain, inflammation, constipation are the some common symptoms of autoimmune disease. Autoimmune vasculitis, celiac disease, type 1 diabetes, rheumatoid arthritis are the some disease caused by autoimmune disease. Complete blood count and erythrocyte sedimentation rate are the two laboratory test taken for the diagnosis of autoimmune disease. Non-steroidal anti-inflammatory drug and glucocorticoids are the used drug for the autoimmune disease.

Keywords: autoimmune disease; inflammation; symptoms; laboratory diagnosis; drugs.

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I. INTRODUCTION

Abnormal response of the immune system is referred as autoimmune disease. [1]Normally immune system recognizes its own tissue antigen and it does not produce any antibody against it.But in autoimmune disease, the immune system produces antibodies and the T-lymphocytes against its own tissue.Which results in functional damage in the body? [2]It mistakenly targets the own tissue or organs as if they were foreign cells. [1]Sometimes T cells are the reason for autoimmune disease condition. [3]

II. CLASSIFICATION OF AUTOIMMUNE DISEASE

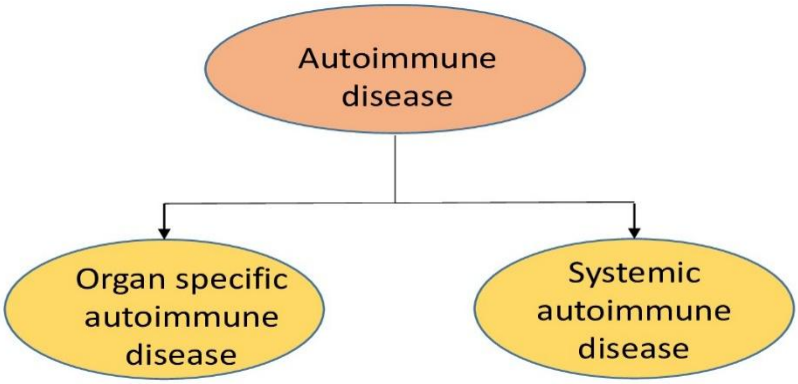

Figure 1: (shows the classification of autoimmune disease)

1. **Organ Specific Autoimmune Disease:** Where the specific or particular organ or tissue is targeted and attacked by the immune system is known as organ specific autoimmune disease.[4] Example : (Table 1) [3]

Table 1: (shows the disease, self-antigen and immune response of organ specific autoimmune disease)

Organic specific autoimmune disease		
Disease	Self-antigen	Immune response
Addison's disease	Adrenal cells	Auto-antibodies
Myocardial infarction	Heart	Auto-antibodies
Hashimoto's thyroiditis	Thyroid proteins and cells	T_{DTH} cells, auto-antibodies
Post streptococcal glomerulonephritis	Kidney	Antigen-antibody complexes

2. **Systemic Autoimmune Disease:** Where the autoantigen is present in the any type of cells in the body is known as systemic autoimmune system [4].

Example: Table 2 [3]

Table 2: Shows the disease, self-antigen and immune response of systemic autoimmune disease

Systemic autoimmune disease		
Disease	Self-antigen	Immune response
Multiple sclerosis	Brain or white matter	TH1 cells and TC cells, auto-antibodies
Rheumatoid arthritis	Connective tissue, IgG	Auto-antibodies, immune complexes
Sjogren's syndrome	Salivary gland, liver, kidney, thyroid	Auto-antibodies

III. SIGNS AND SYMPTOMS

Targeting of immune system towards the own tissue or cells results in inflammation and damage of organ. Due to wide range of autoimmune diseases the following symptoms vary from one to another according to the type of disease and condition of disease.[1] symptoms of autoimmune disease are shown in Table 3. Simultaneously a individual have more than one autoimmune disease is known as polyautoimmunity which further complicating the symptomatology.[1]

Table 3: Shows the signs and symptoms of autoimmune disease

SIGNS AND SYMPTOMS OF AUTOIMMUNE DISEASE	
Symptoms	Cause
Fatigue	Affect mental and physical health[6]
Fever	Shivering, cold and chillness
Swollen glands	Ex: swollen of thyroid glands
Skin problems	rashes
Abdominal pain	Pain in abdominal region
Digestive issue	Improper bowel movement
Joint pain or swelling[5]	Ex : Elbows, knee joint pain

Appearance of the symptoms is not only the diagnostic factor of the autoimmune disease. There is a specific biomarkers to diagnosis and monitor the disease condition.[7]

Table 4: Shows the symptoms of autoimmune system according to affected areas.[28]

AUTOIMMUNE DISEASE SYMPTOMS				
Joints and muscles	Digestive tract or gastrointestinal tract	Skin	Nervous system	Others
Muscle pains. Joint pain, swelling. Muscle weakness. Inflammation.	Bloating Constipation Blood in stools Acid reflux Abdominal pain	Inflammation Rashes Hairloss Dry skin Dry mouth	Dizziness Insomnia Memory loss Head aches Vision problems	Weight Loss / gain Chest pain Fever Irregular heart beat

IV. COMMONLY AFFECTED AREAS

Joints, muscle, connective tissue, blood vessels, skin, endocrine gland are the some commonly tissue level, differentiation in organ growth and function.[7]

V. TYPES OF AUTOIMMUNE DISEASE

It is estimated that there are over 80 recognized types of autoimmune disease exist, the recent scientific evidence shows that existence of potentially more than 100 distinct conditions. [8][9][10](Figure 1.2 shows the types of autoimmune disease based on affecting region)

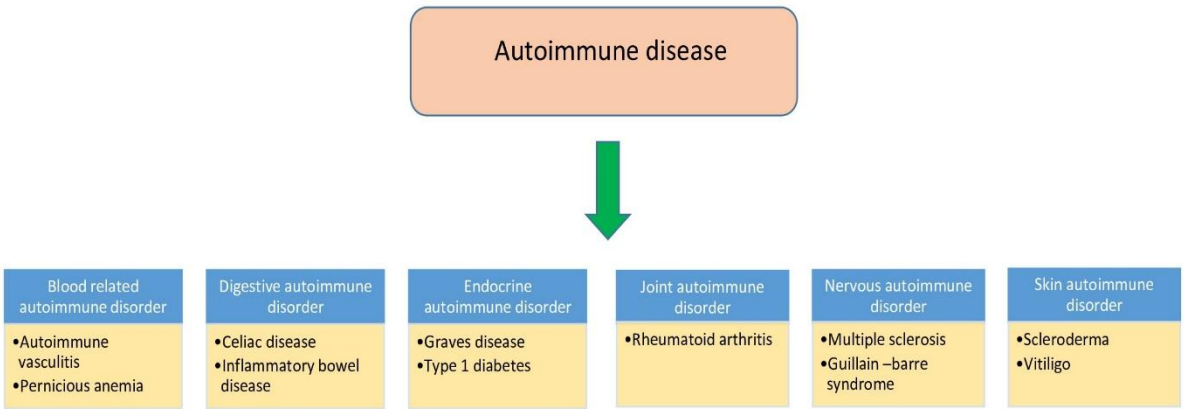

Figure 2: Shows types of autoimmune disease based on affected areas)

1. **Blood related autoimmune disorder:** The blood or blood vessels are attack by the own immune system is known as blood related autoimmune disorder. In the severe case the organ failure or damage may occur.

    - **Autoimmune Vasculitis:** Vasculitis is rare disorder, in which the inflammation happens in blood vessels, arteries, veins, capillaries. It may cause narrowing, full or partial obstruction of blood vessels.[12]

- **Pernicious Anemia:** The disease condition in which there is not enough production of red blood cells due to the deficiency of vitamin B_{12}.[13] Feeling tired and weakness is the common symptoms of pernicious anemia.[14]

2. **Digestive Autoimmune Disorder:** The immune system mistakenly target the cells of gastrointestinal tract. There are many autoimmune disorder associated with digestive system.

    - **Celiac Disease:** The autoimmune condition which was triggered by the eating of gluten rich source is known as celiac disease. a protein which found in the grains like barley, rye and wheat is known as gluten.[11] It affect villi that lines the small intestine. It leads to abdominal discomfort, constipation or diarrhea.[15]
    - **Inflammatory Bowel Disease:** Inflammatory bowel disease (IBD) is the chronic inflammation which leads to the damage in gastrointestinal tract. Chrohn's disease and ulcerative colitis are the two disease condition comes under autoimmune IBD. It leads to diarrhea, fatigue, rectal bleeding, etc.[16]

3. **Endocrine Autoimmune Disorder:** The immune system which targets the specific cells or organs that produce the hormones.

    - **Grave's Disease:** The autoimmune disease that affect the thyroid gland [17] which results in hyperthyroidism[18] and enlargement of thyroid gland.[17] The symptoms of hyperthyroidism is mainly of insomnia, hand tremor, hyperactivity and hairloss.[19]
    - **Type 1 Diabetes:** The cells of pancreatic cells are affected by the immune system. In this condition the pancreas doesn't produce the enough insulin, without enough insulin too much of glucose remains in the blood. It leads to the problem with eyes, kidneys, nerves and heart.[20].

4. **Joint Autoimmune Disorder:** The inflammation which leads to damage of joints and connective tissue.

    - **Rheumatoid Arthritis:** It is the long term disease which affects the joint which results in painful joints, swollen and warm.[21] this disease affect the other part of the body, including skin, heart, lungs, nerves and blood.[21]it decreases the red blood cells count, and shows inflammation in the lungs and heart.[21]

5. **Nervous Autoimmune Disorder:** The brain, spinal cord, or peripheral nerve are the affected part or organ in this autoimmune disease

    - **Multiple Sclerosis:** It slows down the communicable connection between the brain, spine and other parts of the body. It cause damage in myelin sheath of the brain, spinal cord. Multiple sclerosis results in muscle weakness, visual problem.[22]
    - **Guillain–Barré syndrome:** It affects the nerve in the arms, legs and digestive organ which helpful in sensation and movement of body. The symptoms begin with weakness of muscle in legs and arms.[23]

6. **Skin autoimmune disorder (SKD):** The immune system shows the abnormal response to skin is known as SKD.

    - **Scleroderma:** It is group of autoimmune response which changes the skin, blood vessels and muscles.[24][25][26] poor blood flow to the fingers and toes, stiffness, feeling tired are the some symptom seen in scleroderma disease condition. [27]

VI. CAUSES

FACTORS	EXAMPLES
Genetics (may occur often within family members)	Multiple sclerosis, lupus[29]
Environmental factors (chemicals, diet, infectious agent, etc.)[30]	Rheumatoid arthritis,[31] dermatomyositis. [32]
Infections (bacterial or viral).[33]	Rheumatic fever (streptococcus pyogenes is causative agent).[34]
Molecular mimicry (cross reactive with self-antigen by producing antibody against it.)[35]	Guillain–Barré syndrome (C. jejuni infection)[36]

VII. DIAGNOSIS

1. **Medical history:** First step of diagnosing the autoimmune disease involves the collecting of past medical history of the patient and family history (genetic).[37] The physical examination of the patient may shows the inflammation of the organ which is first happen in autoimmune disease.

2. **Laboratory test:** These laboratory tests are helps to identify the presence of certain biomarkers of autoimmune disease. Autoantibody testing,[38] complete blood count (CBC), C-reactive protein,[39] erythrocyte sedimentation rate (ESR)[40] are the some laboratory test which helpful in the identification of autoimmune disease.

3. **Approach the specialist:** The patient who suffer from autoimmune disease must approach the multidisciplinary doctors (neurologist, rheumatologist, dermatologist, gastroenterologist, endocrinologist, etc.) According the affected organ the patient have to consult the specialist.

VIII. TREATMENT

Treatment is based on the affected organ and severity of the disease. Most of the autoimmune disease have no cure, but we can stop the severity of the disease condition.[41]

1. Non-steroidal anti-inflammatory drugs which are helpful to reduce the inflammation of the organ or tissue.[43] (example: aspirin, ibuprofen, naproxen, meloxicam.[45])
2. Glucocorticoids (to reduce the inflammation).[43]
   Example: prednisone, dexamethasone, hydrocortinisone [46]
3. Disease-modifying anti-rheumatic drugs.[43]
   Example: methotrexate, hydroxychloroquine.[47]

4. Monoclonal antibodies (To block the pro-inflammatory cytokines.)[44]
   Example: rituxan.[48]
5. Transfusion of blood if it is a blood related disease, increase the intake of vitamin in the diet, increase the required hormonal supplement of the body which it requires.[42]
6. Physical exercise if the disease is bone or joint related.[42]

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