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Multiple sclerosis

Garlapati. Usha Kiran *, Thummala. Sahithi Priya, Pusunuru. Krishna Kumari, Simhadri Ganga Sai Pradeepa and Sangu Lavanya

Department of Pharmacology NRI College of Pharmacy Pothavarappadu Agiripalli India.

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Abstract

Multiple sclerosis (MS) is a chronic inflammatory demyelinating disease of the central nervous system (CNS), which gives rise to focal lesions in the gray and white matter and to diffuse neurodegeneration in the entire brain. In this review, the spectrum of MS lesion s and their relation to the inflammatory process is described. Pathology suggests that inflammation drives tissue injury at all stages of the disease. Focal inflammatory infiltrates in the meninges and the perivascular spaces appear to produce soluble factors, which induce demyelination or neuro- degeneration either directly or indirectly through microglia activation. The nature of these soluble factors, which are responsible for demyelinating activity in sera and cerebrospinal fluid of the patients, is currently undefined. Demyelination and neurodegeneration are finally accomplished by oxidative injury and mitochondrial damage leading to a state of "virtual hypoxia."

Keywords: Demyelination; Virtual hypoxia; Neurodegeneration; Microglia activation; Spasticity

1. Introduction

Multiple sclerosis (MS) has historically occurred described as a chronic inflammatory disease of the central nervous system (CNS), which leads to large focal lesions in the white matter of the brain and spinal cord,distingushed by primary demyelination with a unstable extent of axonal loss (Charcot 1880). Demyelination and neurodegeneration in the MS brain is co realated with a deep astroglia reaction, forming a dense gli-al scar in long-standing established lesions. For some time, the view on MS pathology centered on focal demyelinated plaques in the white matter. Later it became clear that lesions are also present in the gray matter, including the cortex, the basal ganglia, brain stem, and the gray matter of the spinal cord (Brownell and Hughes 1962 .''(1)''. Furthermore, there is neurodegeneration, which affects the brain and spinal cord in a global sense, giving rise to axonal loss in the normal-appearing white matter, and diffuse neurode-generation in the entire gray matter. These changes finally result in profound brain tissue loss and atrophy, which is most pronounced in the progressive stage of the disease (Mahad et al.2015). ''(2)''The general pathology of MS has been described in detail in several recent reviews 2007; 2014) and, therefore, this article focuses on some essential features. In addition, new findings related to inflammation and its relation to demyelination and neurodegeneration will be discussed in more detail ''(3)''

1.1. Factor

These factors increase the risk of multiple sclerosis

- Age: MS may occur at any age, but usually occurs in people between the ages of 16 and 55.
- Sex: Women have more than two to three times the risk of developing MS.
- Family History: If one of your parents or siblings has MS, you are at risk of developing a disease.

* Corresponding author: G. USHA KIRAN

- Some Infections: Types of viruses are related to MS, including Epstein- Barr, a virus that causes infectious mononucleus.
- Race: White people, especially the northern generation, have the highest risk of developing MS. Asian, African or native Americans are at the lowest risk.

1.2. Symptoms

MS symptoms in people are variable. The two people do not have the same symptoms, and the symptoms of each person can change over time or fluctuate. A person may experience only one or two of the possible symptoms, while another person experiences more than others. More information about your symptoms or the person who has been considered is listed below. ''(4)''

Many of these symptoms can be effectively managed with medication, rehabilitation, and other management strategies. Managing effective factors by an interdisciplinary team of healthcare professionals is one of the most important part of MS's comprehensive care.

- Pain areas: in the back or eyes
- Pain circumstances: can occur in the back due to head nod or with eye movement Tremor: can occur during precise movements, in the hands, or limbs
- Muscular: cramping, difficulty walking, inability to rapidly change motions, involuntary movements, muscle paralysis, muscle rigidity, muscle weakness, problems with coordination, stiff muscles, clumsiness, muscle spasms, or overactive reflexes''(5)''

1.3. Pathophysiology

Demyelination is a division of the myelin sheath caused by an inflammatory and malignant process.an axon that has been partially or completely denuded. At first, the majority of axons are retained although some axons maybe lost. Especially in large chronic plaques. Certain features of ms lesions include perioscular inflammation. followed by myelin scarring. Loss of oligodendrocyte and proliferation of astroglial .''(6)''

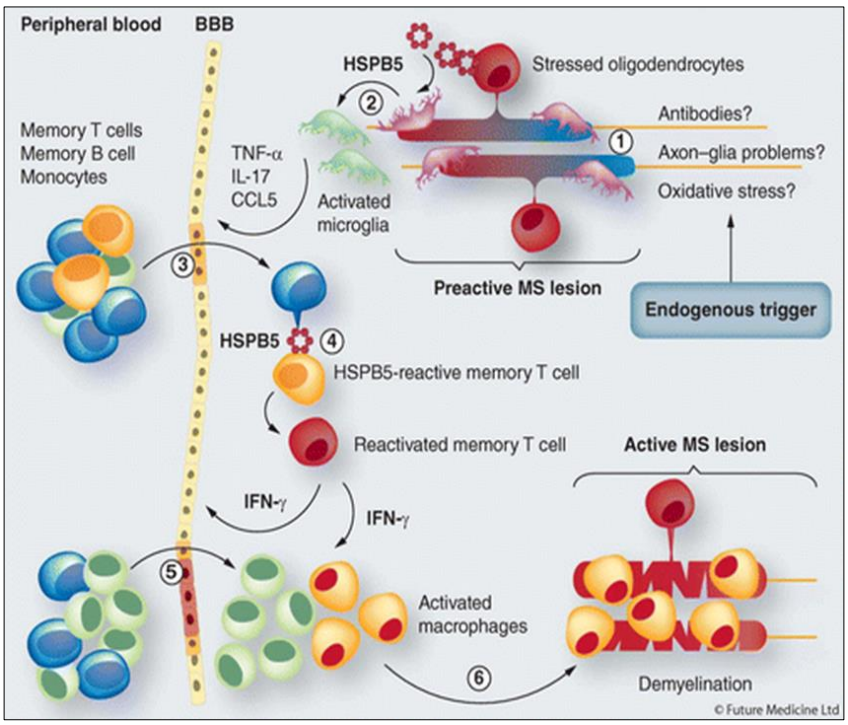
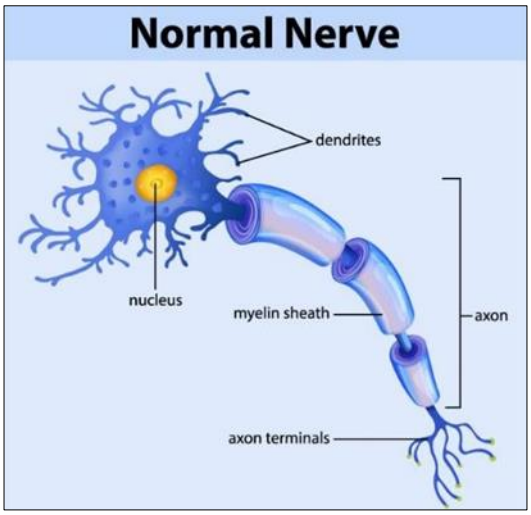


Figure 1 Pathophysiology of multiple sclerosis

Active demyelination or tissue injury is associated with densely populated phagocytic cells, which reveal a morphological phenotype of activated microglia or macrophages. Microglia activation is most pronounced at the edge of actively demyelinating lesions but also abundant in the periplaque or even in the distant normal-appearing white

matter. In the periplaque, white matter clusters of activated microglia are frequently encountered, which in part surround degenerating axons.'' (7,8,9)''



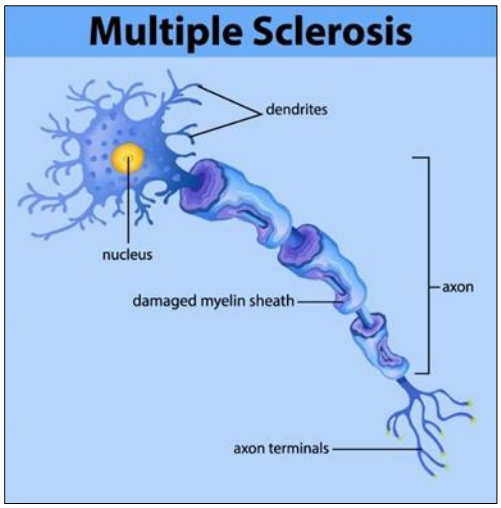


Figure 2(a) Normal Nerve

Figure 2(b) Multiple Sclerosis

2. Methodology

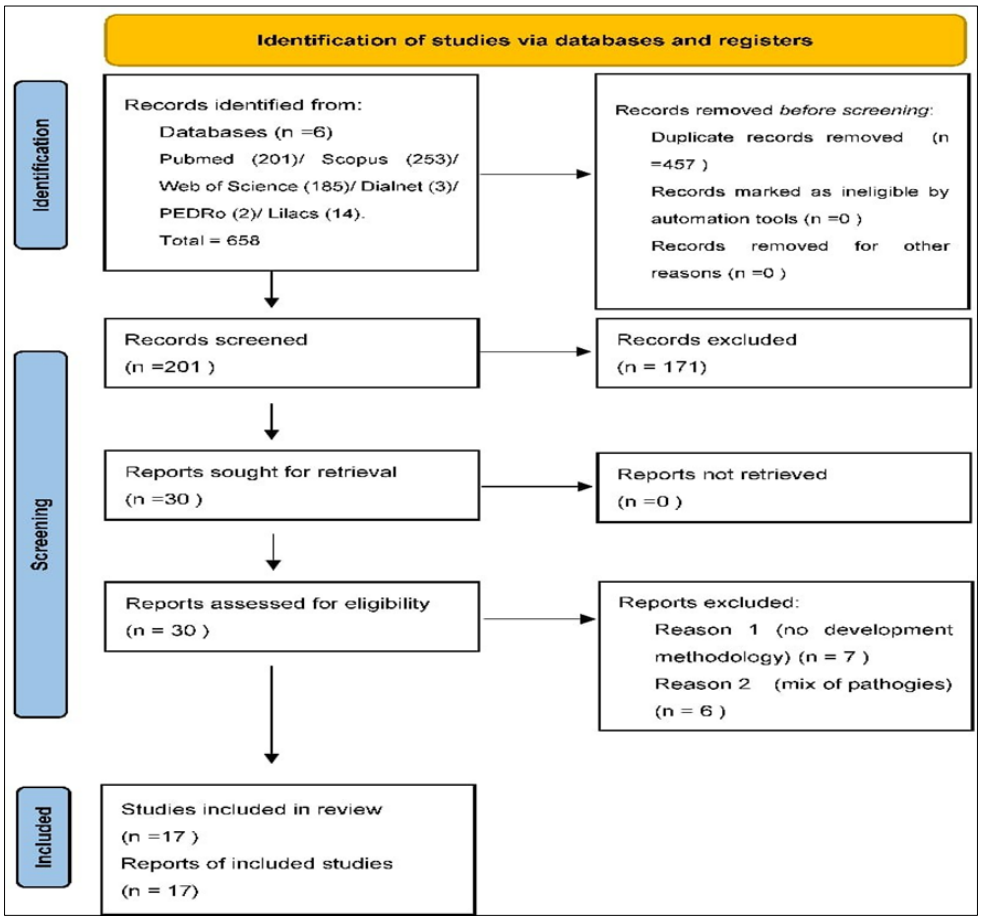


Figure 3 Identification of studies via database and Registers

2.1. Surgical treatments for MS

While there's no cure for MS, some surgeries can ease symptoms and improve quality of life.

2.1.1. Deep brain stimulation

Deep brain stimulation is a procedure used to treat severe tremor in people with MS.

During this procedure, a surgeon places an electrode in your thalamus. This is the part of your brain responsible for these issues. The electrodes are connected to a pacemaker-like device by wires. This device is implanted on your chest under the skin. It passes electrical shocks into your brain tissue surrounding the electrodes.''(10)''

The electrical shocks render this part of your brain inactive. This can help decrease or stop tremors entirely. The level of electrical shock can be adjusted to be stronger or less intense, depending on your reaction. You can also turn the device off entirely if you begin a type of treatment that may interfere with the stimulation'' (11)''

2.1.2. Opening blood flow

An Italian doctor, Paolo Zamboni, used balloon angioplasty to open up blockages in the brains of people with MS.

During his research, Zamboni found that more than 90 percentTrusted Source of patients he saw with MS had a blockage or malformation in the veins that drain blood from the brain. He speculated that this blockage was causing a backup of blood, leading to a high level of iron in the brain. If he could open those blockages, he believed he might be able to relieve symptoms of the condition, possibly even cure it.

He performed this surgery on 65 people with MS. Two years after the surgery, Zamboni reported that 73 percent of participants had experienced no symptoms.

However, a small from the University of Buffalo couldn't replicate Zamboni's findings. Researchers in that study concluded that while the procedure is safe, it doesn't improve outcomes. There was no positive impact on symptoms, brain lesions, or quality of life.

Likewise, a follow-up studyTrusted Source with Zamboni in Canada found no difference after 12 months between people who had the blood flow procedure and people who didn't.''(12)''

2.1.3. Intrathecal baclofen pump therapy

Baclofen is a medication that works on the brain to decrease spasticity. This is a condition that causes muscles to be in an almost constant state of contracture or flex. The medication can decrease the signals from the brain that tell the muscles to engage.

However, oral forms of baclofen can cause some significant side effects, including headache, nausea, and sleepiness. If it's injected near the spinal cord, people with MS have better results, require lower doses, and see fewer side effects.

For this surgery, a doctor will implant a pump near the spinal cord. This pump is programmed to deliver the medication on a regular basis. For most people, the surgery is easily managed. Some people may experience soreness around the incision site. The pump will need to be refilled every few months ''..(13)''

2.2. Symptomatic treatment of MS

2.2.1. Fatigue

The first line treatments for fatigue are usually nonpharmacologic interventions, such as routine exercise. If symptoms persist, treatment with modafinil or amantadine can be considered, although they are not approved by the FDA for MS-associated fatigue. Several recent RCTs showed a beneficial effect of Methylphenidate, a dopamine agonist which inhibits presynaptic dopamine transporters leading to suppression of dopamine reuptake in reducing fatigue in Parkinson's patients in patients with chronic fatigue syndrome and in cancer patients. Controlled studies in PEDMS patients with methylphenidate have not been conducted'' (14, 15, 16, 17)''

2.2.2. Spasticity

For generalized spasticity, treatments with diazepam or baclofen or tizanidine may be used in PEDMS as in pediatric patients with cerebral palsy. Baclofen is generally well tolerated in adult MS, but, since abrupt discontinuation can result in seizures, hallucinations, and hyperthermia, caution should be considered when used in children. For focal spasticity, botulinum toxin A is recommended ''(18,19)''

2.2.3. *Neuropathic pain*

Neuropathic pain is frequently reported in adult MS. Gabapentin is the most commonly used treatment in adult MS. A significant pain relief, at a dose of 600 mg per day, was demonstrated in one study Side effects included mental cloudiness, somnolence, and gastrointestinal complaints. Gabapentin has not been studied in PEDMS. ''(20)''

3 Conclusion

MS results in the destruction of myelin, the protective covering of nerve fibers in the CNS, leading to communication problems between the brain and the rest of the body. Symptoms vary widely and can include fatigue, muscle weakness, difficulty with coordination and balance, vision problems, and cognitive impairment. While there is currently no cure for MS, treatments are available to help manage symptoms, slow disease progression, and improve quality of life for those living with the condition. Research into MS continues, with ongoing efforts to better understand its underlying mechanisms and develop more effective treatments. Early diagnosis and intervention are important for optimizing outcomes and managing the disease effectively.

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