Pregnancies and Women's Health: Multiple Sclerosis

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Abstract

Background: Hormonal, sex, and pregnancy factors all affect how Multiple Sclerosis (MS) develops.

Objective: To examine how the aforementioned elements affect the condition in order to better understand the aetiopathogenic mechanisms at play.

Methods: We searched the PubMed database using the phrases "multiple sclerosis," "MS," "EAE," "pregnancy," "hormonal factors," "treatment," and related terms to conduct a thorough evaluation of scientific articles. We looked at the innovations that were presented at the European Committee for Treatment and Research in Multiple Sclerosis (ECTRIMS) conference that took place in London in March 2013 as well as the advice from global authorities.

Results and Conclusion: We offer suggestions for counselling and caring for MS-afflicted women before, during, and after delivery. Also given are recent results on how treatment affects the mother, foetus, and baby. We provide suggestions for future study to fill knowledge gaps and resolve any discrepancies in the data currently accessible.

Keywords: Multiple sclerosis • Pregnancy • Fertility • Hormones

Introduction

An autoimmune condition known as Multiple Sclerosis (MS) primarily affects women of reproductive age. The majority of autoimmune disorders seem to affect women more frequently than men, which may be due to the potential effects of sex hormones on the immunological, endocrine, and neurological systems.

MS is known to affect more women than males and to be affected by the hormonal changes that women go through during their lifetimes. The evidence that is currently known about the effects of hormonal variables and pregnancy on MS is reviewed in this article. We review the clinical trial findings, discuss findings related to the aetiology and pathophysiology of the disease from experimental models, comment on the implications for managing the progression of the disease and the risk to the foetus, and propose a set of recommendations for the treatment of MS in women of childbearing age and in pregnant women.

Effects of sex hormones in experimental models of multiple sclerosis

The effect of sex hormones on illness expression, prognosis, and activity has been demonstrated in numerous research using both human and animal models of Experimental Allergic Encephalomyelitis (EAE); these results have implications for pregnancy as well as the development of MS treatments. Oestrogens (17-oestradiol [E2] and oestriol [E3]), progesterone, and testosterone have been proven in studies using animal models of EAE to have anti-inflammatory and neuroprotective benefits throughout both the inductor and effector stages of the disease [1-4]. Oestrogen receptors alpha (ER-) and beta (ER-), which are found on CD4+ CD25+ regulatory T cells, regulatory B cells, and dendritic cells, are responsible for these anti-inflammatory effects. The fact that the protective effect vanishes when B cells are removed shows how crucial B cells are for E2-induced protection.

By upregulating programmed death receptor, B cells cause CD4+ Foxp3+ regulatory T cells to become active. The G-protein coupled receptor 30 (GPR30) also appears to be connected to the protective effects of E2 in EAE. When testosterone is turned into oestrogens by the ER or GPR30, it might act through androgen receptors or afterward via GPR30. According to experimental research, androgens can affect the neural androgen receptor to cause CNS remyelination following cuprizone-induced demyelination.

ER-expressed in astrocytes is a mediator of some of oestrogens' neuroprotective effects in EAE.Treatment with ER- ligands may have a protective impact on microglia, avoiding CNS inflammation. ER- ligands may prevent demyelination and encourage remyelination. While testosterone may be able to reestablish synaptic communication in the hippocampus, progesterone appears to be involved in axonal preservation and remyelination.

Sex-specific incidence of multiple sclerosis: Changes in temporal incidence

70% of people with multiple sclerosis are women; 90% of these people encounter their first symptoms before the age of 50; and 20% to 33% of these women will become pregnant after receiving a diagnosis. The incidence of MS in adult women has increased, according to recent epidemiological studies, increasing the female-to-male patient ratio from 2:1 to 3:1 over the past 30 years. According to a Danish registry, the prevalence of MS in women has doubled since 1970, and the proportion of women to males is higher in regions where the disease is more common [1, 2].

The fact that there are more women than men in many places but at varying rates could mean that the disease develops as a result of interactions between genes and environmental factors, lifestyle changes (contraception, diet, obesity, smoking, sunlight exposure, vitamin D deficiency), older ages at first menstruation, younger ages at first childbirth, or fewer pregnancies during a woman's lifetime [3].

The ratio of female to male patients varies depending on age, with 1.5:1 for children under the age of 10, 3:1 for adults and adolescents, and 1:1.5 for patients over the age of 50, who also exhibit a different clinical pattern with a prevalence of progressive forms of the disease [4].

Planning Pregnancy

Numerous issues affect women who want to get pregnant, such as the effects of MS on fertility, the risk of passing MS to children, the effects of MS medication on the fetus, the influence of pregnancy on the disease's

progression, the mother's ability to care for her child, and the socioeconomic burden on the family.

Fertility and multiple sclerosis

The impact of MS on female fertility has not been established. However, compared to women who do not acquire MS, the proportion of women without children is larger in the latter group. There is a decreased incidence of MS among adults (both men and women) who gave birth within the previous five years, according to two epidemiological studies. Parents whose children were born 10 years prior did not experience the apparent protective effect of maternity/paternity. This shows that pregnancy is not in and of itself a protective factor against MS, along with the fact that both men and women had a decreased incidence of MS in the five years following the birth of a child. Alternatively, preclinical MS may work to impair fertility or affect family planning choices, explaining the apparent increased incidence of MS in those without children [5].

Numerous studies have demonstrated that reproductive treatments put MS-suffering women at an increased risk of relapses, with relapse rates rising both during treatment and in the three months following *in vitro* fertilisation. Use of agonists of gonadotropin-releasing hormone has been linked to this. These medications increase the number of cells that produce IL-8, IL-12, IFN-, and TGF-, which may have an anti-inflammatory effect. They also raise the levels of the circulating chemokines CXCL-12 and vascular endothelial growth factor, which aid in the transmission of peripheral blood mononuclear cells across the blood-brain barrier. This could account for the higher rate of MS relapses experienced during reproductive treatment. The abrupt changes in oestrogen levels (which take place during pregnancy and the postpartum period) and the stopping of MS medication during fertility treatment may also play a part [6].

Conclusion

Further study is necessary to understand the current epidemiological changes in MS incidence; new clinical data may lead to innovative techniques for MS prevention and treatment.

Numerous researches have examined how pregnancy affects MS. Results, though, are oftentimes incoherent and conflicting. This can be the result of methodological issues such limited sample sizes, diverse demographics, and confounding variables (comorbidities, treatments, family history, and mother's age). Using patient registries gathered from independent national databases, future research should examine the effects of pregnancy and MS therapy during pregnancy on the course of the disease and examine the long-term impacts on mothers and their offspring. The challenge of merging datasets to produce sizable international cohorts with shared clinical and demographic data is a problem with MS registries.

To understand the mechanisms of action and potential beneficial and harmful consequences of various pharmacological treatments for the disease, more research is required.

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