Epidemiology of Multiple Sclerosis

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KEYWORDS

• Multiple sclerosis • Neuroepidemiology • Public health

KEY POINTS

- Multiple sclerosis (MS) which includes a clinically isolated syndrome, neuromyelitis optica or Devic disease, and acute disseminated encephalomyelitis are common complex neurodegenerative disease of the central nervous system. It manifests as a progressive disease through dissemination in time and space in the brain and spinal cord, due mainly to autoimmune inflammation.
- The disorder engenders an enormous burden of disease and comorbidity, varying with world regions and population ethnicity.
- Genome-wide association studies serve as powerful tools for investigating the genetic substrate of MS.
- There are novel biologic treatments, including fingolimod and natalizumab.
- Supportive treatment includes management of disability, support of generalized symptoms, and psychiatric care.

EPIDEMIOLOGY

Prevalence and Incidence

The Americas

In 2007, Poser and Brinar[1] noted that published prevalence rates of multiple sclerosis (MS) could be misleading with the reliance on clinical information and brain MRI interpretation leading to one-third of incorrect MS diagnoses. This opinion was epitomized by the findings of a clinical questionnaire survey of 30 complete MS clinical histories and examinations, including cerebrospinal fluid (CSF), sent to prominent clinical neurologists around the world.[2] All of the cases were autopsied, 25 patients had clinical MS, 1 had MS plus brain tumor, 1 had MS and stroke, and 3 did not have MS at all. When asked to indicate if the diagnosis was probable, possible, or unlikely MS

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according to their own diagnostic criteria, 108 neurologists responded, correctly identifying only two-thirds of the cases but not the same ones. Experience, country of training, and practice and specialization in MS were inconsequential. Poser and Brinar[1] noted that common errors in global prevalence studies might be the failure to distinguish between the clinical and MRI characteristics of MS and disseminated encephalomyelitis (DEM) in both their acute and chronic forms, cases with onset before entering the study group or moving to the geographic area, and counting cases of the variant neuromyelitis optica (NMO) as an oriental form of MS, falsely inflating prevalence rates of MS in Far Eastern countries and failing to recognize some cases of NMO as instances of DEM.

Evans and colleagues[3] reviewed the incidence and prevalence of MS in the Americas, noting high heterogeneity among all studies even when stratified by country, making comparisons difficult, and noting variation in the quality of the studies. Among 9 epidemiologic studies that estimated MS prevalence and incidence in the United States reported between 1989 and 2007,[4–12] prevalence was highest in Olmstead County, Minnesota,[7] with age-standardized rate (ASR) of 191.2 per 100,000, and lowest in Lubbock, Texas, and the 19 surrounding counties, with an ASR of 39.9 per 100,000. Incidence of MS was reported in Olmstead County, MN[7] with an ASR of 7.3 per 100,000.

Among 12 epidemiologic studies estimating prevalence and incidence in Canada from 1986 to 2010,[13–24] 1 nationwide study used self-reporting information from a national population-based health survey conducted in 2000 to 2001 from a stratified random sample that estimated the crude prevalence of MS to be 240 per 100,000[19] Crude prevalence in individual regions of Canada ranged from 56.4 per 100,000 in Newfoundland in 1985[13] to 298 per 100,000 in Saskatoon in 2005.[22] The highest reported incidence of MS was in Alberta, with an ASR of 20.6 per 100,000 in 2002[25] and 23.9 per 100,000 for 2004.[23] However, the latter was based on invalidated administrative health claims.

A total of 6 studies from 4 countries in Central and South America examined the prevalence and incidence of MS from 1992 to 2009[26–31] but only 1[31] produced estimates for the entire country, noting a crude prevalence for Panama during 2000 to 2005 of 5.24 per 100,000 and annual incidence from 1990 to 2005 of 0.15 per 100,000.[31] Both prevalence and incidence were highest in the Argentine Patagonia region with a 2002 crude prevalence of 17.2 per 100,000 and annual incidence of 1.4 per 100,000.[29]

A meta-analysis evaluating prevalence estimates from 59 countries found a statistically significant latitudinal gradient for prevalence even after age-standardization and adjustment for prevalence year,[32] whereas a previous review of MS prevalence in Canada found no striking latitudinal or longitudinal gradient[33] similar to another study[29] that found and no south-north gradient in prevalence within the Argentine Patagonia. Prevalence estimates of MS were much lower in South America compared with North America, according to Evans and colleagues,[3] despite the studied regions being similar distances from the equator. This was possibly due to variations in the methodologies used, the quality of medical care, and the differential population susceptibility to MS.[34] Such conflicting findings suggest that geography alone may not predict the prevalence or risk of MS. Although it has been suggested that the prevalence of MS has increased in recent years,[35] it may partly be explained by a longer life expectancy in those with MS, and not necessarily an indicator of an increased risk of the disease, as well as advances in the identification of affected cases as a consequence of increased access to neurologists and improved methods of case ascertainment. Although most studies examine prevalence, incidence may be a better measure of increased disease risk.[34]