Multiple sclerosis in New Zealand Maori

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Short Report

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Abstract: The prevalence of MS in New Zealand in 2006 was 73.2 (age standardized per 100,000) while for those with indigenous Māori ancestry it was 3.6 times lower at 20.6. Earlier regional surveys (1968–2001) all reported much lower, or zero, prevalence for Māori than European. There was no evidence for differences in MS between those with and without Māori ancestry in either clinical features or latitude, confirming that Māori ancestry does not produce the reported increase in prevalence with latitude. It is likely that prevalence is increasing in low risk Māori; however, MS prognosis is independent of Māori ancestry.

Keywords: Multiple sclerosis, prevalence, Māori, indigenous, clinical symptoms, latitude gradient

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Introduction

New Zealand (NZ) is an ethnically diverse Southern Hemisphere country with a population of mainly European (78%) and indigenous Māori (16%) ancestry. All previous regional studies found high prevalence of multiple sclerosis (MS) in the NZ population with European ancestry but identified very few cases among NZ Māori.[1–5] While under-reporting contributes to low disease prevalence in indigenous populations, differences in genetic factors such as a low frequency of HLA-DRB1*1501[4,6] and differing susceptibility to environmental factors[7] are also likely to play a role.

Latitudinal variation in the prevalence of MS is present in many countries including NZ,[5,8,9] which has latitude extending between 35 and 48 °S with MS three times more prevalent in the south than the north. In NZ, the latitudinal gradient has been partially attributed to several ethnic (and by implication genetic) factors that might influence MS risk,[7,10] including more low risk indigenous Māori living in northern areas.

We aim to characterize differences in MS susceptibility and prognosis associated with Māori ancestry in NZ.

Methods and data

All earlier NZ prevalence studies were identified by a systematic search and compared with the New Zealand National Multiple Sclerosis Prevalence Study (NZNMSPS),[8] a cross-sectional study of all persons diagnosed with MS (McDonald criteria, 2005) resident in NZ on national census day, 7 March 2006. Patients with clinically isolated syndromes, possible MS, neuromyelitis optica (NMO) and NMO spectrum disorders were excluded leaving 2917 persons with definite MS in 2006. Māori ancestry and clinical features in the NZNMSPS were primarily recorded from a questionnaire[8] with a response rate of 71%. Ethnicity was based on ancestry in NZ prior to 2006.

Prevalence was standardized to the European standard population (ESP) with both early (0–19 years) and older (80+ years) age ranges collapsed. Raw prevalence with Poisson 95% confidence intervals (CIs) was used where age data are unavailable for standardization from earlier studies. Latitude gradients were calculated excluding the northern region dominated by Auckland city; see Taylor et al.[8] for details.

Results

In 2006 there were 89 respondents identified with Māori ancestry, three (3.4%) did not identify any other ancestry while 76 (85.4%) also identified European ancestry (10 identified Māori and other ancestry). Conversely, of the 1976 respondents with European ancestry, 1754 (88.8%) did not identify any other ancestry while 76 (3.8%) identified Māori

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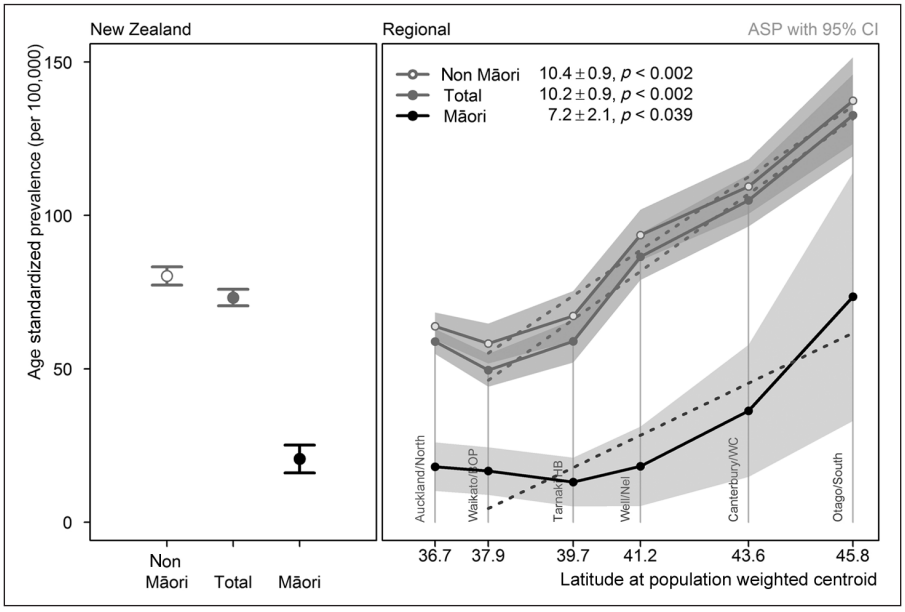

Figure 1. MS prevalence age standardized to the European standard population for the total population and subpopulations with Māori and without Māori ancestry for New Zealand and regions within New Zealand.
ASP: age standardized prevalence; CI: confidence interval

ancestry too. The age standardized prevalence (ASP) of MS in Māori was 20.6 per 100,000, significantly lower than that of the national MS cohort, 73.2 per 100,000, giving a standardized rate ratio of 3.6 (95% CI: 2.8–4.4, p<0.001), Figure 1.

The Māori population in NZ was younger than both the NZ national population and the ESP; however, there was no difference (p > 0.25) in mean age between Māori and non-Māori within the MS population. Similarly there were no significant differences in clinical characteristics between Māori and the national MS cohort (Table 1).

The national MS cohort and those with no Māori ancestry exhibited a latitudinal gradient from north to south (37.9 to 45.8 °S) at a rate of 10.7±0.9, p < 0.002, and 10.0±0.9, p < 0.002, per 100,000 per degree of latitude respectively (Figure 1). The ASP gradient in Māori was lower at 7.2±0.1 (p<0.005), but this difference is not statistically significant (p = 0.24).

Imputation for missing ancestry data raises the total Māori ASP to 30.7 (95% CI 23.0, 38.3), mostly in Auckland, 29.2, and increases the latitude gradient to 9.9±1.9, statistically indistinguishable from the non-Māori gradient. Imputation makes no statistically significant changes to clinical features.

The earliest three[2,3,5] of five regional prevalence studies conducted in NZ between 1968 and 1981 did not identify any Māori persons as cases; two later studies (1983, 2001)[1,4] noted one and three cases respectively (Table 2). Crude prevalence for the latter two studies falls within the 95% CIs calculated from the 2006 data, albeit at the lower end.

Discussion

Low prevalence among indigenous groups, particularly in non-mixed populations without European genetic influence, have been reported in other hemispheres and populations.[11] The working hypothesis is that low risk or naïve native genetic pools acquire high risk alleles such as *HLA-DR1*1501* following European contact resulting in clinical expression of MS in individuals of mixed ancestry generations later. The prevalence of MS is lower in Māori than non-Māori in all regions studied. As in other indigenous populations,[6] the low prevalence of MS in Māori compared with NZ Europeans[4] has been attributed to genetic factors. In 1986, Miller et al.[4] showed a higher frequency of HLA-DR2 distribution in persons with MS (63%) compared with European (30%) and Māori controls (7%). Additionally, the frequency of HLA-A3 and HLA-B7, other MS risk haplotypes, in Māori controls was about one-fifth that of European controls. Thus the low prevalence of MS may be related to a low frequency of HLA-DR2 in Māori, similar to the indigenous Sami who have a low frequency of the HLA-DRB1*1501 haplotype (DR2) and a low prevalence of MS.[6]

Table 1. Comparison of demographic and clinical features between New Zealand (NZ) Māori and the national MS cohort.

	NZ Māori (n = 89)	National MS cohort (n = 2,917)
Sex ratio (female:male)	2.6:1	3.0:1
Age at onset of first symptoms	34.2 ± 11.4	35.0 ± 10.8
Time to diagnosis	4.5 ± 5.9	4.8 ± 6.6
Duration of disease	15.8 ± 11.7	16.6 ± 11.6
EDSS	4.1 ± 2.9	3.9 ± 2.8
MSSS	0.5 ± 0.3	0.5 ± 0.3
Relapsing–remitting onset	82.0%	84.3%
Most common first symptoms		
Transverse myelitis	44.9%	36.0%
Optic neuritis	15.7%	17.1%

Mean ± standard deviation or percentage (%). Time in years.
EDSS: Expanded Disability Scale; MSSS: Multiple Sclerosis Severity Scale.

Table 2. Māori multiple sclerosis prevalence estimates from all previous New Zealand prevalence studies.

Study	Census	Location	Cases	Prevalence	NZNMSPS 2006		
					Cases	Prevalence	
Hornabrook[3]	1968	Wellington	0	0	4	6.3	(0.1, 12.5)
Cuningham[2]	1971	Christchurch	0	0	9	19.5	(6.8, 32.3)
Skegg et al.[5]	1981	Waikato	0	0	8	9.3	(2.9, 15.8)
Skegg et al.[5]	1981	Otago-Southland	0	0	12	40.9	(17.8, 64.0)
Miller et al.[4]	1981	Wellington	1	4.3	4	6.3	(0.1, 12.5)
Chancellor et al.[1]	2001	Bay of Plenty	3	4.7	8	10.9	(3.3, 18.4)

Raw prevalence per 100,000 of population with 95% confidence interval for 2006.
NZNMSPS: New Zealand National Multiple Sclerosis Prevalence Study[8].

Despite Māori having significantly lower susceptibility to MS, clinical features including sex ratio, age at onset, time to diagnosis, MS subtype, EDSS and MSSS are not significantly different from the total MS population, suggesting a discordance between risk factors for disease susceptibility and disease prognosis.

The latitudinal gradient within NZ has been partially attributed to genetic admixture among NZ Europeans[7]. However, the Australian and New Zealand Genome-wide MS association study (ANZgene)[12] finding of less than 5% variation between cases and controls was explained by genomic differences, arguing against significant genetic admixture in New Zealanders of European ancestry with MS. The NZNMSPS Māori ancestry data are consistent with low admixture in the mostly European non-Māori (3.8% identifying Māori ancestry).

Similarly, although 87% of the Māori population live in the North Island, the MS latitude gradient remains in the population without Māori ancestry (Figure 1); hence the geographical distribution of Māori ancestry does not explain the presence of the latitudinal gradient.

Worldwide, the incidence and prevalence of MS appears to be on the rise;[13] whether this is also true of indigenous populations is generally not known. Successive NZ studies (1968–2006) show an increase in MS prevalence in Māori within the same region surveyed (Table 2). Increased awareness of MS, greater availability of magnetic resonance imaging and changing diagnostic criteria may partially account for increased case ascertainment. However, our present study suggests increasing MS prevalence but no differential prognosis in the Māori population. Future studies elucidating the mechanisms of the relatively

low but increasing susceptibility to MS in Māori are warranted.

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Conflict of interest

None declared.

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