Pediatric Multiple Sclerosis: Demographic and Clinical Findings from the US Network of Pediatric MS Clinics

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Abstract

Background: Pediatric MS incidence is estimated at 0.2-0.6/100,000 persons; demographic and clinical features of US samples are incompletely characterized.
Objectives: Characterize pediatric MS patients from geographically diverse US regions.
Methods: Children and adolescents (< 18 years) were prospectively enrolled in a longitudinal observational study across 9 sites forming the US Network of Pediatric MS Centers.
Demographic: Of 340 cases, girls: boys = 2:1. Percentage of girls increased from 53% (≤ 11 yrs) to 71% (≥ 12 yrs). Mean age of onset was 13.7 (girls), 12.7 (boys). Race was self-identified as Caucasian (67%), African-American (20%), multi-racial (7%), other (6%). Race did not differ by gender (p=0.59) or age (p=0.40). Ethnicity was 69% non-Hispanic; 31% Hispanic. For 38% of the cases, one or both parents were born outside the continental US, most frequent: Mexico (29%), Puerto Rico (9%), Dominican Republic (8%). 5.3% of cases were foreign born.
Clinical: 31% of children had a prodrome prior to the first event: infectious (67%), closed head trauma (10%), vaccination (9%). Monofocal (60%) vs. polyfocal (40%) presentation, p< 0.01. Encephalopathy (5%) was more frequent among the youngest ≤ 11yrs (14%) vs ≥ 12 yrs (2%) p< 0.01. Optic neuritis (27%) was highest among those ≤ 11yrs (34%) vs ≥ 12 yrs (24%) p=0.07. At the initial visit, 77% had EDSS < 3. For those with ≥ 1yr follow-up (n=256) mean ARR=0.49.
Conclusions: Individuals from the US with pediatric MS vs. adult MS differ demographically with fewer Caucasians and many more first generation Americans. Overall, the female ratio increases with age; Encephalopathy is more common among the youngest.

Objectives

Describe the demographic and clinical features of a large US cohort of pediatric MS patients.

Methods

Children and adolescents (< 18 yrs) were prospectively enrolled in a longitudinal observational study across the nine sites forming the US Network of Pediatric MS Centers.
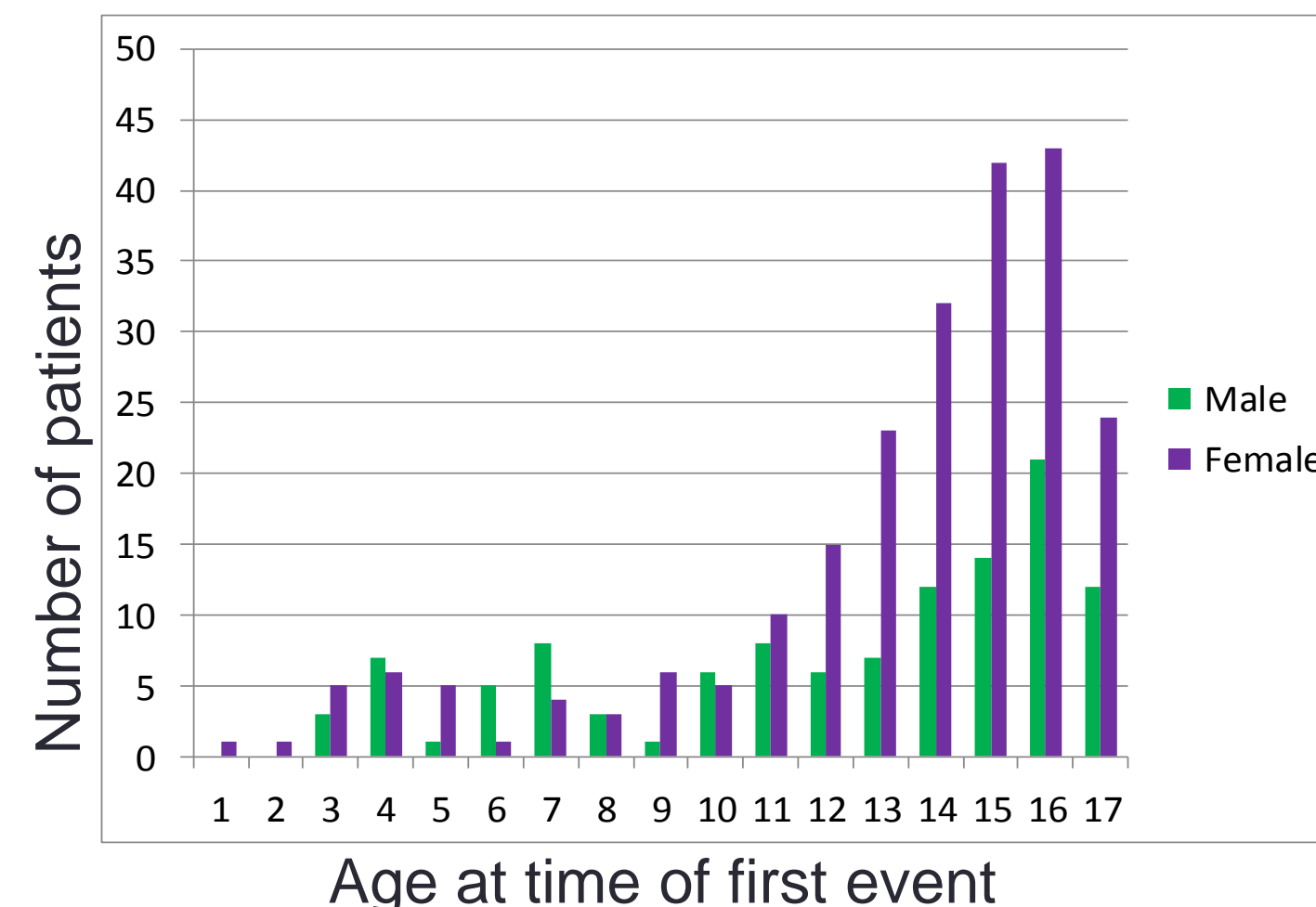
RESULTS

Demographic Features

Gender variation across age groups

Age at time of first event	Girls	Boys	Ratio (Girls:Boys)
Under 12 years old	47 (53%)	42 (47%)	1.1 : 1
12 to <18 years old	179 (71%)	72 (29%)	2.5 : 1

Gender & age at time of first MS attack

Age at time of first event	Girls n=226	Boys n=114
Mean	13.8	12.7
Median	15	14.1
Range (Min-Max)	1.7 - 17.8	3.2 - 17.9

% female cases increases with age, from 53% (≤11 yrs) to 71% (> 12 yrs)

Race and Ethnicity

Characteristic	Overall (n = 340)
Race	
White	208 (61%)
Black/African-American	63 (19%)
Multiracial	22 (6%)
Other	18 (5%)
Unknown	29 (9%)
Ethnicity	
Hispanic or Latino	99 (29%)
Not Hispanic or Latino	222 (65%)
Unknown	19 (6%)

Parent's country of origin

Country	Overall (n=340)
Outside USA	130 (38%)
Mexico	38 (29%)
Dominican Republic	9 (7%)
Haiti	8 (6%)
Jamaica	8 (6%)
Puerto Rico	12 (9%)
Other Country	57 (44%)

- patients may be represented multiple times in this table due to parents from different non-USA countries
- percentages for individual countries are out of the number of patients with a parent from outside the USA
- Other countries include: Afghanistan, Bahamas, Bermuda, Brazil, Canada, Chile, China, Colombia, Ecuador Egypt, El Salvador, French Guiana, Germany, Guatemala, Hong Kong, India, Iran, Israel, Italy, Jordan, Libya, Nigeria, Nicaragua, Panama, Peru, Phillipines, Portugal, Russia, Saudi Arabia, Serbia, South Korea, Taiwan, Thailand, Vietnam, Suriname

Patient's country of origin

Country	Overall (n=318*)
United States of America	301 (95%)
Puerto Rico	2 (1%)
Russia	2 (1%)
Mexico	2 (1%)
Other	11 (3%)

* Unknown place of birth for 22 patients
- Other includes: Saudi Arabia (1), Dominican Republic (1), Iran (1), Italy (1), Portugal (1), Bosnia (1), Fiji Islands (1), Albania (1), Virgin Islands (1), United Arab Emirates (1), Unknown (1)

Family hx autoimmune disease with ≥ 5 pts

Family Autoimmune Disease	Number of Patients
Diabetes: Adult Onset	119
Thyroid Disease	44
Rheumatoid Arthritis	40
Multiple Sclerosis	20
Other	16
Atopic dermatitis / Eczema	14
Psoriasis	14
Inflammatory Bowel Disease / Crohn's Disease / Ulcerative Colitis	13
Systemic Lupus Erythematosus	11
Hashimoto's Disease	7
Grave's Disease	7
Vitiligo	5

* Patient may be represented multiple times

Clinical Features

Clinical features of first event

	0 to <11 years	11 to <14 years	14 to <17 years	17 to <18 years	Overall
Clinical Characteristic	N = 71	N = 69	N = 164	N = 36	N = 340
Clinical Antecedent (Prodromal Event)	32 (45%)	23 (33%)	42 (26%)	7 (19%)	104 (31%)
Infection*	27 (84%)	12 (52%)	25 (60%)	6 (86%)	70 (67%)
HeadTrauma*	3 (9%)	4 (17%)	3 (7%)	0 (0%)	10 (10%)
Vaccination*	2 (6%)	4 (17%)	3 (7%)	0 (0%)	9 (9%)
Emotional Stressor*	0 (0%)	1 (4%)	1 (2%)	0 (0%)	2 (2%)
OtherTrauma*	0 (0%)	2 (9%)	3 (7%)	0 (0%)	5 (5%)
Rash*	2 (6%)	0 (0%)	1 (2%)	0 (0%)	3 (3%)
OtherAntecedent*	5 (16%)	1 (4%)	9 (21%)	0 (0%)	15 (14%)
Encephalopathy	12(17%)	5 (7%)	1 (1%)	0 (0%)	18 (5%)
Monofocal**	31 (54%)	40 (71%)	81 (59%)	16 (57%)	168 (60%)
Polyfocal**	26 (46%)	16 (29%)	57 (41%)	12 (43%)	111 (40%)

* Percents are out of the number of patients in the age category with a clinical antecedent
** Missing data for 61 patients; these are not included in the percentages

Clinical Features continued

Sx of first event

	0 to <11 years	11 to <14 years	14 to <17 years	17 to <18 years	Overall
Symptom	N = 71	N = 69	N = 164	N = 36	N = 340
Vision	26 (37%)	30 (43%)	52 (32%)	9 (25%)	117 (34%)
Motor	38 (54%)	31 (45%)	70 (43%)	18 (50%)	157 (46%)
Constitutional*	31 (44%)	23 (33%)	49 (30%)	7 (19%)	10 (32%)

* p<0.05 comparing age groups

Localization of first event

	0 to <11 years	11 to <14 years	14 to <17 years	17 to <18 years	Overall
Localization	N = 71	N = 69	N = 164	N = 36	N = 340
Optic nerve	26 (37%)	18 (26%)	41 (25%)	6 (17%)	91 (27%)
Cerebrum	30 (42%)	20 (29%)	62 (38%)	11 (31%)	123 (36%)
Brainstem/Cerebellar	33 (46%)	34 (49%)	59 (36%)	15 (42%)	141 (41%)
Spinal Cord	11 (15%)	18 (26%)	70 (43%)	20 (56%)	119 (35%)

	≤ 11 years	vs.	≥ 12 years	p
% encephalopathy	17%		2%	<0.01

Mean (SD) EDSS = 3.4 (2.4); Annual relapse rate = 0.49 (n=256)

Conclusions

- Pediatric MS in the USA is demographically distinct:
    - fewer Caucasians.
    - more first generation Americans.
- The female ratio increases with age.
- Encephalopathy occurs more in MS <11 yrs of age.

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