United States Network of PEDIATRIC MULTIPLE SCLEROSIS Centers

A prospective case-control study of dietary salt intake and risk of pediatric MS

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BACKGROUND

- Environmental and dietary factors have become increasingly recognized as risk factors for developing multiple sclerosis (MS).
- High salt intake has been shown to increase disease onset and progression in recent animal studies of the MS model. It is unknown whether these results are applicable to humans.
- Pediatric MS offers a unique opportunity to study salt intake as a potential dietary risk factor close to MS onset.

OBJECTIVE

- To determine whether dietary salt intake is associated with pediatric MS risk in a multi-center, case-control study.

METHODS

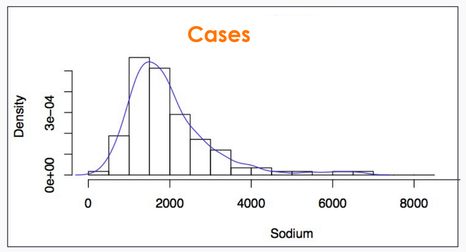
- **Cases:** met McDonald MS criteria with onset before 18 years of age, less than 2 years duration, and seen at one of 13 pediatric MS centers.
- **Controls:** <20 years of age and seen at general pediatric clinics at the same participating institutions.
- The Block Kids Food Screener (BKFS, NutritionQuest) was used to estimate dietary sodium intake.
- The BKFS is a validated, self-report questionnaire designed for children and adolescents 2-17 years old and includes 41 questions on food and beverage consumption during the past week.
- Sodium intake was compared between cases and controls. Excess sodium was defined by the Adequate Intake (AI), the recommended daily sodium intake based on age and gender.
- Logistic regression models adjusted for age, gender, race and ethnicity were performed.

RESULTS

Table 1. Baseline characteristics between cases and controls.

	Cases N=138	Controls N=285	All N=423	P-value
Age (mean +/- SD)	15 (4)	14 (4)	14 (4)	<.01
Energy (kcal/day)	1295 (594)	1353 (648)	1334 (631)	0.36
Total fat (g/day)	53 (28)	55 (29)	54 (29)	0.36
Gender				0.02
Female	83 (60.14%)	137 (48.07%)	220 (52.01%)	
Race				0.12
American Indian, Alaskan Native	4 (2.90%)	3 (1.05%)	7 (1.65%)	
Asian	6 (4.35%)	18 (6.32%)	24 (5.67%)	
Black, African American	23 (16.67%)	50 (17.54%)	73 (17.26%)	
Native Hawaiian, Pacific Islander	1 (0.72%)	0 (0.00%)	1 (0.24%)	
White	80 (57.97%)	190 (66.67%)	270 (63.83%)	
Mixed	13 (9.42%)	14 (4.91%)	27 (6.38%)	
Unknown, missing	11 (7.97%)	10 (3.51%)	21 (4.96%)	
Ethnicity				<.01
Hispanic or Latino	44 (31.88%)	51 (17.89%)	95 (22.46%)	
Not Hispanic or Latino	90 (65.22%)	228 (80.00%)	318 (75.18%)	
Unknown, missing	4 (2.90%)	6 (2.11%)	10 (2.36%)	

Figure 1. Histograms depicting sodium intake between cases and controls.



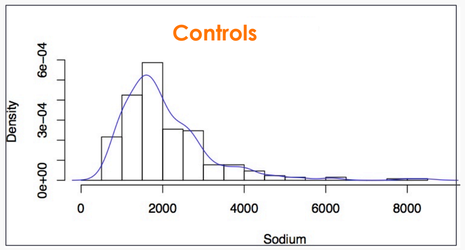


Table 2. Comparison of unadjusted sodium intake between cases and controls.

	Gender	Cases N=138	Controls N=285	All N=423	P-value
Sodium (mg/day)	All	1965 (1059)	2072 (1133)	2037 (1109)	0.29
	Male	2349 (1215)	2435 (1333)	2412(1300)	
	Female	1711 (859)	1681 (679)	1692 (750)	
Excess sodium (%)	All	86/138 (62%)	195/285 (68%)	281/423 (66%)	0.21
	Male	43/55 (78%)	117/148 (79%)	160/203 (79%)	
	Female	43/83 (52%)	78/137 (57%)	121/220 (55%)	

RESULTS CONT.

- Cases (mean=15 years) were older on average compared to controls (mean=14 years.) There were significantly more females and Hispanic/Latino cases compared to controls (Table 1).
- Unadjusted analyses showed no difference in mean sodium intake between cases (1965 mg/day) and controls (2072 mg/day). Similar proportions of cases (62%) and controls (68%) consumed more than the recommended sodium allowance per day (Table 2).
- The mean sodium intake for male cases and controls exceeded the tolerable upper limit (2300 mg/day) for sodium intake.
- A non-significant trend toward increased odds of MS (1.015) for each 100 mg increase in sodium (95% CI 0.992, 1.038; p=0.19) was observed in the multivariate analyses adjusted for age, gender, race and ethnicity.

CONCLUSIONS

- No significant difference in dietary sodium intake was found between cases and controls in the preliminary analysis.
- BKFS results showed that a high proportion of subjects consumed more than the recommended amount of sodium per day.
- Adjusted analyses suggesting a trend toward increased likelihood of MS with increasing sodium intake underscore the need for further research. Analyses adjusted for body mass index and socioeconomic status in this multi-center cohort are currently underway.

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