Correlation between essential tremor and migraine headache

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Abstract

The relationship between essential tremor (ET) and migraine was investigated in a prospective study. In a group of 74 ET patients 36.5% had migraine compared with 17.7% of 102 control subjects without tremor. In a group of 58 patients with migraine 17.2% had ET compared with 1.2% of 85 controls without migraine. The prevalence of ET in migraine controls was greater than controls without migraine (22% compared with 1%; $p = 0.002$). It is concluded that there is an association between essential tremor and migraine.

Clinical observations suggest a possible correlation between essential tremor and migraine. We have therefore carried out a cross-sectional study of the relationship between essential tremor and migraine.

Patients and methods

Patients were evaluated for the presence of essential tremor and migraine. Essential tremor was diagnosed on the basis of a postural and kinetic tremor without any other known causation.^{1,2} Migraine was defined according to the guidelines provided by the selection committee of the National Institute of Health.³ Seventy four patients (52 men, 22 women; average age 59 years, range 15-83 years) with the diagnosis of essential tremor were identified in movement disorders clinics. Thirty two patients had a positive family

history of tremor and 23 had a family history of migraine headache. Alcohol improved the tremor in 53 patients. Fifty eight patients (23 men, 35 women; average age 39 years, range 12-68 years) were identified with migraine in headache clinics. Thirty nine had a family history of migraine. Alcohol triggered migraine in 21 patients.

One hundred and eight controls selected from students, hospital staff and visitors (not to the neurology service) were interviewed by observers unaware of the purpose of the study; 23 had migraine (8 men, 15 women; average age 39 years). Six had ET (2 men, 4 women; average age 47 years). There were 85 controls without migraine and 102 controls without essential tremor. Proportions were compared by Chi-square, Fisher's Exact Test and by the Mantel-Haenszel summary Chi-square Test for stratified analysis. *T*-tests were used to compare means. Logistic regression analysis was used to examine the associations between incidence of migraine headache and essential tremor, controlling for other variables (age, sex and race).

Results

Demographic characteristics for the three groups are presented in table 1. The essential tremor patient group had significantly more males (70%) than either the migraine patient group (40%) or the control group (45%). Essential tremor patients were also significantly older (mean 60 years) than migraine patients (mean 39 years) or controls (mean 43 years). Racial distributions were similar within the three groups.

MIGRAINE HEADACHES IN SUBJECTS WITH ESSENTIAL TREMOR

When control subjects only were analysed (table 2), the sample size of the essential tremor sufferers was very small. Nevertheless, the difference in prevalence of migraine headache between essential tremor sufferers (83%) and other controls (18%) was highly significant. Analyses controlling for race, sex or age yielded similar results. When the essential tremor patient group was compared with the control group, excluding control group subjects with essential tremor (table 3), the essential tremor patients were significantly more likely ($p = 0.005$) to suffer from migraine headaches (36%) than controls (18%). Since the sex and age distributions

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Table 1 Demographic characteristics by group

	Control group n = 108	Migraine patient group n = 58	Essential tremor patient group n = 74
Sex—Male	49 (45%)		
Migraine patients	8/23 (33%)	23 (40%)	
Essential tremor	2/6 (33%)		52 (70%)**
Race—Black	39 (36%)		
Migraine	7/23 (29%)	16 (28%)	
Essential tremor	2/6 (33%)		27 (36%)
Age—x (SD)	43.2 (16.2)		
Migraine	40.7 (13.5)	38.8 (14.5)	
Essential tremor	47.2 (20.1)		60.2 (15.2)*
Migraine sufferers	23 (21%)	58 (100%)	27 (36%)
Essential tremor	6 (6%)	10 (17%)	74 (100%)

*Significantly different from mean age of control group, $p < 0.0001$.

**Significantly different from percentage of males in control and migraine patient groups ($p < 0.0004$).

Table 2 Analysis of controls only: comparison of those with and without essential tremor on presence of migraine, stratifying on race, sex and age

Stratifying Variable	Percentage with migraine headaches		Odds Ratio	p Value
	Essential Tremor Sufferers	No Tremor		
Total	5/6 (83%)	18/102 (18%)	23.3	0.002 Fisher's Exact Test
Race				
Black	2/2 (100%)	5/37 (14%)	21.5	<0.001 Mantel-Haenszel Test
Hispanic	0/0 —	1/3 (33%)		
White	3/4 (75%)	12/62 (19%)		
Sex				
Male	2/2 (100%)	6/47 (13%)	19.0	0.001 Mantel-Haenszel Test
Female	3/4 (75%)	12/55 (22%)		
Age				
< 55	2/3 (67%)	15/77 (19%)	20.8	0.001 Mantel-Haenszel Test
≥ 55	3/3 (100%)	3/25 (12%)		

Table 3 Comparison of essential tremor patients with controls (without essential tremor) in proportion with migraine headaches: results given overall and stratified on race, sex and age

Stratifying Variable	Percentage with migraine headaches		Odds ratio	p Value
	Essential tremor patients	Controls		
Total	27/74 (36%)	18/102 (18%)	2.7	0.005
Race				
Black	9/27 (33%)	5/37 (14%)	2.7	0.005 Mantel-Haenszel Test
Hispanic	3/9 (33%)	1/3 (33%)		
White	15/38 (39%)	12/62 (19%)		
Sex				
Male	17/52 (33%)	6/47 (13%)	3.2	0.002 Mantel-Haenszel Test
Female	10/22 (45%)	12/55 (22%)		
Age				
< 55	13/16 (81%)	15/77 (19%)	6.0	<0.001 Mantel-Haenszel Test
≥ 55	14/58 (24%)	3/25 (12%)		

Table 4 Logistic regression results estimating odds ratios for migraine headache, controlling for age and sex

Variable	Estimated odds ratios for migraine (p values)	
	Control group only Tremor versus non-tremor	Tremor patients versus controls
Essential tremor	26.6 (0.005)	12.1 (<0.0001)
Sex female	1.7 (0.31)	2.3 (0.05)
Age (20 year difference)	1.5 (0.26)	3.4 (<0.0001)

Table 5 Analysis of controls only: comparison of those with and without migraine headaches on presence of essential tremor, stratifying on race, sex and age

Stratifying Variable	Percentage with essential tremor		Odds ratio	p Value
	Migraine	No migraine		
Total	5/23 (22%)	1/85 (1%)	23.3	0.002 Fisher's Exact Test
Race				
Black	2/7 (29%)	0/32 (0%)	21.5	<0.001 Mantel-Haenszel Test
Hispanic	0/1 (0%)	0/2 (0%)		
White	3/15 (20%)	1/51 (2%)		
Sex				
Male	2/8 (25%)	0/41 (0%)	19.0	0.001 Mantel-Haenszel Test
Female	3/15 (20%)	1/44 (2%)		
Age				
< 55	2/17 (12%)	1/63 (2%)	20.8	0.001 Mantel-Haenszel Test
≥ 55	3/6 (50%)	0/22 (0%)		

differed significantly in these two groups, stratified analyses were performed. In the analysis controlling for age, the summary odds ratio estimate was increased from 2.7 to 6.0; when sex was controlled for, the summary odds ratio was increased to 3.2. Stratifying on race did not change the estimates. Logistic regression analyses (table 4) simultaneously controlling for sex and age yielded similar results within the control group only. However, in the comparison of tremor patients with controls, the estimated odds of migraine were 12.1 times greater for essential tremor sufferers, 2.3 times higher for females and 3.4 times higher for younger subjects.

ESSENTIAL TREMOR IN MIGRAINE SUFFERERS
When controls only were analysed (table 5) 22% of migraine sufferers had essential tremor while only 1% of controls without migraine did (p = 0.002). Results were unchanged for stratified analysis. Note that table 5 is a rearranged version of table 2, and thus odds ratios and p values are identical. When the migraine patient group was compared with the control group, excluding controls who reported suffering from migraine (table 6), a significantly higher (p = 0.001) percentage of migraine patients had essential tremor (17%) than controls (1%). Results were unchanged on stratification by age, sex or race. Logistic regression analyses controlling for both sex and age yielded similar results (table 7).

Discussion
Both essential tremor and migraine are common neurological disorders. The prevalence of essential tremor is between 0.3 and 5.6% of persons over the age of 40 years,²⁻⁴ with an estimated five million Americans affected. Approximately 50% of cases are familial with an autosomal dominant mode of transmission with variable penetrance. Migraine is thought to affect 15–20% of the general population.^{5,6} A parental history of migraine is obtained in 50–60% of patients with migraine compared with 10–20% of headache-free subjects.^{7,8} Both essential tremor and migraine are frequently associated with left hand dominance^{9,10} and alcohol improves essential tremor¹¹ but worsens migraine.¹² It is curious, however, that beta adrenergic blocking drugs cause amelioration of both conditions.^{13,14} Our data indicate that essential tremor and migraine occur together more frequently than just by chance alone and younger patients with essential tremor seem more likely to have migraine. The association between the two diseases in hospital patients^{15,16} was further supported by the high association between the two disorders in the controls. It is difficult to explain the reason for such an association until there is a greater understanding of the pathophysiology of both disorders.

Table 6 Comparison of migraine patients with controls (who do not suffer from migraine headaches) in proportion with essential tremor: results given overall and stratified on race, sex and age

Stratifying Variable	Percentage with essential tremor		Odds ratio	p Value
	Migraine patients	Controls		
Total	10/58 (17%)	1/85 (1%)	17.5	0.001 Fisher's Exact Test
Race				
Black	3/16 (19%)	0/32 (0%)	18.5	<0.001 Mantel-Haenszel Test
Hispanic	1/9 (11%)	0/2 (0%)		
White	6/33 (18%)	1/51 (2%)		
Sex				
Male	4/23 (17%)	0/41 (0%)	15.9	0.001 Mantel-Haenszel Test
Female	6/35 (17%)	1/44 (2%)		
Age				
< 55	9/50 (18%)	1/63 (2%)	15.6	0.001 Mantel-Haenszel Test
≥ 55	1/8 (13%)	0/22 (0%)		

Table 7 Logistic regression results estimating odds ratios for essential tremor, controlling for age and sex

Variable	Estimated odds ratios for essential tremor (p values)	
	Control group only Migraine versus non-migraine	Migraine patients versus controls
Migraine headache	28.9 (0.005)	16.2 (0.009)
Sex female	1.1 (0.92)	1.2 (0.76)
Age (20 year difference)	2.0 (0.27)	1.3 (0.54)

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