Prevalence and heritability of early-onset migraine

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Introduction

The heritability of migraine is around 40-50% in adults. No sex differences in heritability have been reported, but migraine is 2-3 times more prevalent in women. During adolescence, migraine prevalence in girls increases. Here, we examine the heritability and prevalence of early-onset migraine in adolescents between 12 and 20 years of age.

Methods

Sample

Adolescent twins and their siblings, registered with the Netherlands Twin Registry (N=6774, 55% girls). Heritability analyses were restricted to twins between 12 and 20 years of age (N = 5337).

Migraine Assessment

Migraine symptomatology was assessed with a mailed questionnaire that included items on migraine symptoms [diagnostic criteria of the International Headache Society]. Participants who screened positive for a screening question completed detailed questions about headache symptoms.

Statistical Analyses

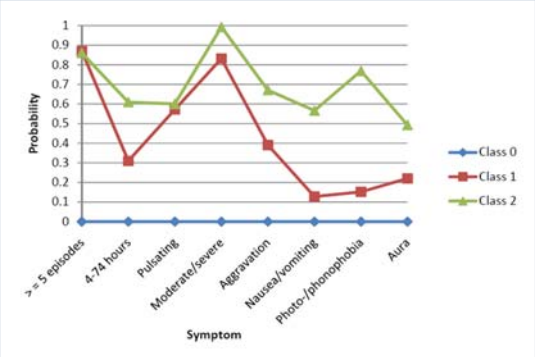
Data were analysed with latent class analysis (LCA) to obtain an empirical classification, based on the pattern of reported symptoms of all available individuals with headache data (twins and singleton siblings, N=6774). The correct number of classes was determined based on the Bayes Information Criterion (BIC). Age and sex were included as covariates. A liability model was tested in Mx. Likelihood ratio tests determined the significance of genetic and environmental factors.

Results

LCA

The best-fitting model had 3-classes. **Figure 1** shows prevalences of migraine symptoms within each class. Class 0 represents individuals without headaches (85% of the sample). Class 1 represents a mild form of headache (8%). Class 2 represents moderate to severe migrainous headaches (7%). The 3-category variable obtained in the LCA was used as the phenotype in genetic analyses.

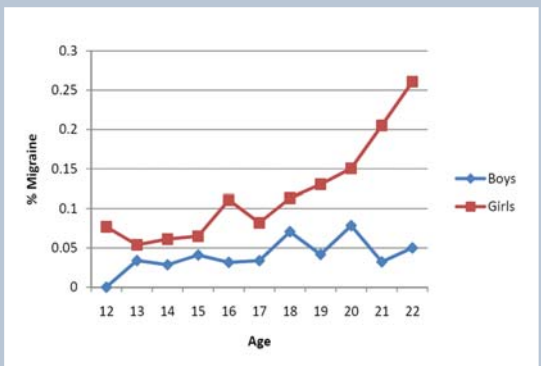
Figure 1: symptom profiles



Prevalence

Figure 2 shows the prevalence of class 2 migrainous headache in boys and girls. Girls have a higher prevalence at all ages. After age 15 the prevalence increases in girls but not in boys. The average first onset of menarche in the girls was fourteen years and one month.

Figure 2: migraine prevalence



Heritability

Heritability was estimated for twins aged 12-15 (N=1388 complete twin pairs, and 135 incomplete pairs), and twins aged 16-20 (N=1116 complete and 194 incomplete pairs). In the younger age group, the MZ twin correlation was .48 and the DZ correlation was .13. In the older age group, the MZ correlation was estimated at .33 and the DZ correlation was .09. No significant sex differences in the twin correlations were detected. In both age groups a model was tested including additive (A) and non-additive genetic effects (D) and non-shared environmental factors (E). In the youngest group (12-15y), contributions of A, D and E were estimated at 0%, 46% and 54%, respectively. Dropping the non-additive genetic effects from the model resulted in a significant deterioration of the model fit ($\chi^2(1) = 5.33$, $p = .02$). In the older age group (16-22y), the estimates were 5%, 27% and 67%, respectively. Non-additive effects were not significant. Under an AE model, the relative contribution of genetic effects was estimated at 30%.

Discussion

The symptom profiles for the 3-class model are similar to those observed in a previous study in adults (Ligthart et al, Cephalalgia, *in press*). A small but significant sex difference in migraine prevalence was observed in the younger age group. After age 15, the sex difference gradually became larger as a result of an increased prevalence in girls. The estimated heritability was slightly larger in the younger age group, and this group also showed some evidence of non-additive genetic effects. However, in general, both the LCA results and heritability estimates are similar to our previous findings in adults.