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Original Article

Pediatric Migraine Prescription Patterns at a Large Academic Hospital



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ABSTRACT

BACKGROUND: Here we report the prescription patterns by drug type, age, and sex of patients at a large academic pediatric hospital. Because there are few guidelines based on outcome studies in pediatric migraine, physician treatment approaches in children vary. **METHODS:** Using the i2b2 query tool, we determined that over an approximately 4 year period, 4839 patients between the ages of 2 and 17 years were observed at Boston Children's Hospital for migraine with or without aura, 59% women and 41% men. **RESULTS:** The most common medications prescribed to this population were sumatriptan, amitriptyline, topiramate, ondansetron, and cyproheptadine. **CONCLUSIONS:** Our findings support recent data regarding choices of medication in the pediatric population and additionally support current studies and future investigation into controlled trials in the pediatric population.

Keywords: migraine, pediatric, prescription, pharmacotherapy, amitriptyline, sumatriptan

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Introduction

Headaches are the third leading cause of emergency department visits in the United States and are one of the top five health problems affecting children. Pediatric migraine is a widespread condition, affecting an estimated 17% of American children,¹ but even this may be an underestimation.² Prevalence of migraine in children is reported to be 3% (2–7 years), 4–11% (7–11 years), and 8–23% (>11 years).³ Children with migraine struggle not only with the pain and discomfort of a migraine episode but also with the challenges of missing school or activities and being unable to function at a normal level of ability.⁴ This is detrimental to the child's education, and school attendance has been

indicated to effect a child's emotional well being,⁵ quality of life,⁶ and academic performance.⁷

In spite of the prevalence of migraine, there is minimal guidance for effective treatment. A limited number of medications are Food and Drug Administration (FDA) approved for migraine treatment in adults, and even fewer are approved for pediatric use. Most prescription migraine treatments for children are, therefore, off-label. In addition, guidelines for pharmacologic treatments in pediatric migraine are not outcome based, including reports outlining a general approach,^{8–10} treatment in the emergency department,^{11,12} and migraine prevention.¹³ These findings are, perhaps, surprising given that migraine is so prevalent in children, particularly girls at their peripubertal stage,¹⁴ and that the condition may last for decades after childhood.

Little is documented regarding prescription patterns of migraine treatments, especially in children. In this report, we review the prescription patterns of migraine medications to patient's aged 2–17 years at a large academic children's hospital (Boston Children's Hospital).

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Methods

Data were obtained using the i2b2 platform (Boston, Massachusetts), which allows for deidentified access to the electronic medical record system.¹⁵ The platform allows users to identify patient sets using International Classification of Diseases, Version 9 (ICD-9) diagnosis codes. With this tool, we were able to identify sets of patients observed at Boston Children's Hospital (main campus and satellite/affiliate locations) who were diagnosed with ICD9 346.0 (classical migraine or migraine with aura) or ICD9 346.1 (common migraine or migraine without aura) between January 1, 2010, and November 1, 2013, and were between the ages of 2 and 17 years at the time of their visit. The search approach was as follows: Group 1—classical migraine, with or without mention of intractable and common migraine, with or without mention of intractable; Group 2—age, from 2 years up to 17 years; and Group 3—was prescribed any one or more in a set of medications. These three groups were linked such that one or more of the concepts in each group had to occur during the same clinical encounter.

With the previously mentioned approach we first determined total numbers of patients who were 2–17 years at the time of a diagnosis with migraine during the 2010–2013 time frame (group 1 and 2) and then determined the total number of migraine patients prescribed a certain medication (group 1, 2, and 3). We then evaluated what percentage of the total migraine patient population the prescribed patients represented. We also determined the sex breakdown for each query. Table 1 summarizes the basic search terms applied to all searches (Group 1, Group 2, and time frame). Table 2 lists the specific medication terms queried by drug category (i.e., triptans, antiepileptic drugs, tricyclic antidepressants, beta blockers, antiemetics, calcium channel blockers, alpha blockers, angiotensin-converting enzyme inhibitors, selective serotonin reuptake inhibitors, ergotamine derivatives, angiotensin receptor blockers, cyproheptadine, botulinum toxin, and acetaminophen/butalbital/caffeine) in Group 3.

Once the most commonly prescribed medications were determined, further queries were performed according to age groups. For triptans, antiepileptic drugs, tricyclic antidepressants, beta blockers, and antiemetics, the most commonly prescribed medication in the class was used to determine prescription rates at specific age ranges (2–6, 7–11, and 12–17 years). The same was performed for cyproheptadine and acetaminophen/butalbital/caffeine.

Results

Epidemiology

A total of 4839 patients between 2 and 17 years old were observed and coded with a migraine diagnosis or migraine with aura or migraine without aura over the approximate 4-year period. The percentage of girls in the sample was 59% and boys 41%. There was no distinction made for patients with intractable migraine.

Medications

Medications prescribed to the greatest percentage of migraine patients were: triptans (sumatriptan, zolmitriptan, rizatriptan, and eletriptan), antiepileptic drugs (topiramate, gabapentin, and zonisamide), tricyclic antidepressants (amitriptyline and nortriptyline), antiemetics (ondansetron, prochlorperazine, and metoclopramide), a beta blocker

(propranolol), cyproheptadine, and acetaminophen/butalbital/caffeine. Medications in other classes and other medications in the previously mentioned classes were prescribed to fewer than 48 patients (1% of the total migraine patient sample) and were deemed not prevalent enough to list. The top five most commonly prescribed medications are listed as follows, with notation of total number and percentage of all migraine patients: sumatriptan (755 patients, 15.6% of migraine patients), amitriptyline (591 patients, 12.2%), topiramate (342 patients, 7.1%), ondansetron (334 patients, 6.9%), and cyproheptadine (321 patients, 6.6%).

Sex-biased prescriptions

We observed that medications were prescribed to a higher percentage of the female migraineur population than the male migraineur population (Figure). For medications prescribed to 1% or more of migraine patient's aged 2–17 years, all drugs except ondansetron, cyproheptadine, and zolmitriptan were prescribed to a higher percentage of the female population than the male population (Table 3). When groups were divided by age subset, different patterns emerged (Table 4). In the young (2–6 years) group, the population was very small, with cyproheptadine being the most common medication prescribed. This was prescribed to a slightly larger fraction of the female population than the male population (21.6% of females versus 18.6% of male migraineurs received the prescription). In the preadolescent (7–11 years) group, sumatriptan, ondansetron, cyproheptadine, and acetaminophen/butalbital/caffeine were all prescribed to a greater percentage of the male population than the female population, but only ondansetron and cyproheptadine differed significantly. In the adolescent (12–17 years) group, only ondansetron and cyproheptadine were prescribed to a greater percentage of the male population. Thus, in the young and adolescent groups, a greater fraction of the female population received prescriptions for most medications. In the preadolescent group, a greater fraction of the female population received prescriptions for preventative medications other than cyproheptadine.

Age-related prescriptions

When sumatriptan, amitriptyline, topiramate, ondansetron, propranolol, cyproheptadine, and acetaminophen/butalbital/caffeine were further examined by age subgroup, it was found that the young age range (2–6 years, 354 patients) most commonly received cyproheptadine (72 patients, 20.3% of subset), followed by ondansetron and sumatriptan. The preadolescent age range (7–11 years, 1539 patients) most commonly received cyproheptadine (199 patients, 12.9%), followed by sumatriptan and ondansetron. The adolescent age range (12–17 years, 3261 patients) most commonly received a prescription for sumatriptan (616 patients, 18.9%), followed by amitriptyline and topiramate, as summarized in Table 4.

Discussion

Although it would be expected that girls, making up a larger proportion of the migraine patient population, would be prescribed medications in greater numbers, it is surprising that there is also a difference in the fractions of male migraineurs and female migraineurs receiving a given

TABLE 1.
Search Parameters

Diagnosis	ICD9 346.0 Classical Migraine With or Without Mention of Intractable ICD9 346.1 Common Migraine With or Without Mention of Intractable
Time period	January 1, 2010–November 1, 2013
Age at visit	2–17 yr

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