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Similarities and Differences between Migraine in Children and Adults: Presentation, Disability, and Response to Treatment

Ashley M. Kroon Van Diest, PhD^{1,*}, Michelle M. Ernst, PhD^{1,2}, Shalonda Slater, PhD^{1,2,3}, and Scott W. Powers, PhD, ABPP, FAHS^{1,2,3}

¹Division of Behavioral Medicine and Clinical Psychology, Cincinnati Children's Hospital Medical Center

²Department of Pediatrics, University of Cincinnati College of Medicine

³Headache Center, Cincinnati Children's Hospital Medical Center

Abstract

Purpose of Review—This review presents findings from investigations of migraine in children and adults. Similarities and differences in the presentation, related consequences, and treatments between children and adults are reviewed.

Recent Findings—Significant similarities exist in the presentation, disability, and treatments for migraine between children and adults. Despite such similarities, many adult migraine treatments adapted for use in children are not rigorously tested prior to becoming a part of routine care in youth. Existing research suggests that not all approaches are equally effective across age groups. Specifically, psychological treatments are shown to be somewhat less effective in adults than in children. Pharmacological interventions found to be statistically significant relative to placebo in adults may not be as effective in children and have the potential to present more risk than benefit when used in youth. The placebo effect in both children and adults is robust and is need of further study. Better understanding of treatment mechanisms for all interventions across the age spectrum is needed.

Summary—Although migraine treatments determined to be effective for adults are frequently adapted for use in children with little evaluation prior to implementation, existing research suggests that this approach may not be best practice. Adaptation of adult pharmacological treatment for use in youth may present a particular risk in comparison to benefits gained. Because of the known efficacy of psychological treatments, such as cognitive behavioral therapy, more universal use of these interventions should be considered, either as first-line treatment or in combination with pill-based therapies.

Keywords

migraine; headache; treatment; pediatric; adult

Corresponding Author: Scott W. Powers, PhD, ABPP, FAHS; Cincinnati Children's Hospital Medical Center, Division of Behavioral Medicine and Clinical Psychology, MLC: 7039 3333 Burnet Avenue, Cincinnati, OH 45229-3039; Phone: 513-636-8106; Fax: 513-636-7544; Scott.Powers@cchmc.org.

*Dr. Kroon Van Diest is now an Assistant Professor at the Cleveland Clinic in Cleveland, OH.

Introduction

Migraine is a common health complaint affecting approximately 12% of the population in the United States aged 12 years or older [1]. Migraine is a leading cause of disability across all age groups, resulting in a significant annual economic impact of approximately \$36 billion (direct medical costs + lost productivity) in the U.S. [2]. It is a chronic illness that represents challenges due to the episodic nature of painful attacks as well as the inter-event worry about the next attack and the recurrent, unpredictable interruptions in day-to-day life [3]. Typical onset of migraine occurs during early to mid-adolescence, although it can begin at any age [4]. Those who experience migraine at a younger age often continue to experience migraine episodes into adulthood [5]. Given this common pattern of early onset and continuation of migraine throughout the lifespan, understanding the trajectory of migraine from childhood to adulthood and best practices for treatment within different age groups is pertinent for appropriate and efficient patient care.

Despite high frequency of migraine in youth persisting into adulthood, differences between youth and adults in migraine etiology, presentation, and treatment have not been well elucidated to date. In fact, children are often managed as ‘little adults’ in terms of migraine treatment. As such, adult migraine treatments are often adapted for use in children and are expected to be as effective in youth as they are in adults. The goal of the current review is to highlight similarities and difference in migraine between youth and adults, specifically highlighting relevant research suggesting treatment approaches to migraine in children should not simply be adapted from existing adult migraine treatments despite similarities in the presentation of migraine.

Presentation

Clinical presentation of migraine is generally similar regardless of age, and is characterized by head pain that is moderate to severe in intensity [6, 7]. It is typically unilateral (or bilateral in youth) and frequently accompanied by a throbbing or pulsating sensation. Other associated migraine symptoms include nausea, vomiting, phonophobia, and photophobia. Migraine episodes can occur with or without sensory disturbances known as aura. Migraine episodes are labeled as chronic when they occur on 15 or more days per month with at least eight episodes including moderate to severe intensity and the above listed features and associated symptoms.

Disability

The World Health Organization (WHO) lists migraine as one of the top 20 causes of disability worldwide [2, 8, 9]. The significant disability related to migraine is associated with high costs to individuals and society. While direct medical costs to patients is significant, indirect costs of missed work exceed medical costs. Additional costs associated with migraine-related disability include missed school for youth, and decreased ability to participate in social or extracurricular activities across all age groups.

Although migraine-related disability is common across all age groups, the contexts in which disability interferes differs between children and adults. For children and adolescents,

migraine often leads to significant levels of functional disability in home, school, and social settings, including frequently missing days of school or functioning while at school at less than 50% of typical productivity due specifically to migraine. Among the areas of functioning impacted, school functioning is particularly important given that many children and adolescents with chronic pain-related conditions have been found to miss more school, have poorer academic performance, greater difficulty paying attention in class, and increased risk of depression than their healthy same-aged peers [10].

Similar to youth, migraine-related disability has significant impact in home, and social settings for adults [11-13]. Impact on home life for adults includes challenges in maintaining the home environment and caring for children and/or other family members. Adults with migraine also frequently experience comorbid anxiety and depressive disorders. One major area where migraine-related disability is more likely to impact in adults than youth is the work environment. Adults with migraine miss significantly more workdays than their same-aged colleagues without migraine. Further costs associated with loss of productivity for adults who attempt to work with a migraine are significant and create indirect burden for employers.

Family Factors

For both children and adults, migraine impacts those around them (e.g., causes problems for their loved ones, such as parents and/or partners)[14]. Studies have demonstrated increased burden on family members as a result of migraine, with the burden for children with migraine falling on parents or caregivers [15, 16] and adult migraine burden falling on partners or spouses[17] (and children in the family). Such burden includes increased stress on family members, decreased relationship quality, and decreased family involvement in leisure or social activities. Such stressors are also related to increases in anxiety and depression in family members [16, 18]. Increased stressors on family are often positively correlated with higher levels of migraine-related disability in children and adults [19].

Migraine is, in turn, influenced by family members; however, this relationship has not been widely studied across age groups, with most research in this domain focusing on the parent-child relationship. Existing research has demonstrated that certain parenting variables can negatively impact children's migraine because of children's heavy dependence on their caregivers [20]. For example, existing problems with family communication can lead to increased problems with pain management in children as well as increased relational difficulties between parents and children [21]. Additionally, pre-existing physical or mental health concerns in parents can have negative impact on frequency, intensity, and ability to manage migraine in their children [22, 23]. Such conditions can include parents with chronic pain conditions (including migraine), and mental health conditions such as depression and anxiety. Importantly, it can be difficult to determine if conditions such as depression and anxiety in parents developed as a result of managing a child with migraine or if they existed prior to their child developing migraine [20].

Treatment

Treatment for pediatric migraine is often approached similarly to that of adult migraine, such that once a treatment is deemed effective in adults it is typically used to treat migraine in children without rigorous assessment prior to implementation. While common, this pattern of translating adult treatments for use in children without careful study may not reflect best practice. This is particularly true and challenging for pharmacological interventions. In fact, some recent research on use of preventive medication in children suggests that this approach may have more risks than benefits [24]. Further, the Food and Drug Administration (FDA) guidelines regarding use of medications for pediatric migraine treatment clearly state that there are differences in migraines between children and adults, such that “one cannot assume that a drug effective in adults will also be effective in children”(pg. 7) [25].

Medication

Both abortive and preventive medications are frequently recommended and used for migraine treatment across all age groups. Common abortive medications for migraine that are used in both children and adults include acetaminophen, non-steroidal anti-inflammatories (e.g., ibuprofen, naproxen), and triptans[7, 26-30]. Of these medications for acute migraine treatment, many have been tested and demonstrate effectiveness in both children and adults [26].

Preventative medications are also commonly recommended and prescribed for migraine treatment in children and adults [7, 26, 31-38]. A number of medications are used for migraine prevention, and include antidepressants (amitriptyline), antiepileptics (topiramate), and antihypertensives (propranolol). This list is by no means exhaustive, but includes those that are most frequently used in both children and adults. Importantly, many of these medications were tested and deemed effective (i.e., a significant statistical difference was found between medication and placebo) for migraine treatment in adults [7], followed by their use in children and adolescents with little scientific exploration prior to being used in patients under the age of 18. Of note, what is considered clinically significant improvement versus a certain level of statistical separation found to be significant between treatment groups in clinical trials may not be the same, and we generally find greater clinical improvement in youth than adults [39, 40]. In many adult studies, generally a 1 to 2 headache day reduction difference between a medication and control condition (e.g., placebo) has been found, and viewed potentially to be of clinical benefit as well [31-33]; while in our NIH-funded clinical trials of pediatric migraine, a 50% or greater reduction in headache days is commonly seen, and an even more relevant clinical outcome can be reduction of headache days to 1 or less per week with little to no disability [40]. When considering differences that may be found between pediatric and adult outcomes, the level of expectation for what can result from treatment in terms of headache day and disability reduction may differ. Certainly these likely differences between a pediatric and adult patients' outcomes can affect clinical trial design as well as day-to-day clinical care. Because of this, more discussion and careful thought about this issue is needed across the age spectrum [41].

While it may seem that medications effective in migraine prevention for adults should also be effective for migraine prevention in youth, a recent clinical trial assessing the effectiveness of two commonly used prevention medications for migraine prevention in children suggests that this may not be the case [24]. The CHAMP Study compared amitriptyline, topiramate, and placebo groups in youth ages 10-17 years across a 24-week period. Results from this study revealed no significant between-group differences in headache-related disability or headache days between any of the groups, indicating that preventive medication is no better than placebo in reducing headache days or disability in youth with migraine. Additionally, patients receiving active drug (amitriptyline or topiramate) had significantly more adverse events when compared to patients on placebo, suggesting that medication may have greater cost than benefit to patients. These findings highlight the importance of investigating medications prior to use in children despite demonstrated effectiveness in adults. Further, the results indicate that it is important to study non-pharmacological interventions as potentially effective treatment for pediatric migraine. The placebo effect is robust in both adults and youth. Further study of the placebo effect and its mechanisms are needed. Results from such investigations could be promising in terms of harnessing this impact (versus trying to minimize it) [42, 43].

Lifestyle recommendations

Recommendations of daily lifestyle activities for migraine management are typically consistent across age groups. These recommendations include consistent intake of food, staying hydrated, and sleeping and exercising regularly [7, 12, 26, 44]. Specifically, at minimum, food intake should include three meals a day (without skipping meals). Hydration recommendations vary slightly depending on age and activity level, but include an average of 8-10 cups of non-caffeinated fluid per day (greater physical activity includes increased recommendations of fluid intake). Consistent with best practice for physical activity regardless of migraine diagnosis, exercising 30 minutes or more 3-5 times per week is recommended. And finally, recommended duration of sleep also varies by age, but falling asleep and waking around the same time on a consistent bases is encouraged [28, 34].

While such recommendations are consistent across age groups, some age-related challenges faced by adults may interfere with their ability to adhere to these practices [12]. For example, adults with migraine typically have more health-related comorbidities as a result of ageing that make it difficult for them to regularly exercise. Age related changes in sleep can also result in less consistent sleeping patterns and fewer hours of sleep each night for adults.

Psychological treatment

Psychological treatments for migraine have been evaluated for use in both children and adults [13, 45, 46]. Such approaches can be used in place of or in combination with pharmacological migraine treatment. The most commonly used psychological treatment for migraine is cognitive-behavioral therapy (CBT). Specific skills commonly taught in CBT for migraine management include behavioral relaxation strategies of deep diaphragmatic breathing, progressive muscle relaxation, and guided imagery, as well as problem solving, and cognitive restructuring. Biofeedback is often incorporated in CBT during teaching of relaxation strategies, as it allows patients to see physiological changes that occur in their

body (i.e., decreased heart rate, muscle tension) as a result of using relaxation skills [13, 45, 46]. The goal of CBT is to teach people with migraine how to employ coping skills to manage migraine pain when it occurs, prevent migraine episodes through regular use of relaxation strategies and other stress reducing skills, and assist in alleviating related disability and/or comorbid symptoms of anxiety and depression [47].

Psychological treatments delivered in a face-to-face format have been found to be effective in reducing pain and disability in children and adolescents with headache, with therapeutic gains maintained across time [45]. Cognitive behavioral therapy (CBT) in particular, has shown good evidence for the management of headache pain in children and adolescents and focuses on coping skills training, including biofeedback-assisted relaxation training [48]. Results from a randomized clinical trial evaluating the effectiveness of CBT as a form of treatment for chronic migraine among children and adolescents indicated that participants in a CBT plus amitriptyline condition showed greater reductions in migraine days per month than patients who were in a headache education plus amitriptyline condition [46]. Additionally, parents are likely to be involved in CBT that their child completes for migraine management given children's reliance on parents for help and guidance in migraine management [20].

CBT for adults includes similar components to those skills taught to youth (biofeedback assisted relaxation skills, cognitive restructuring, problem solving etc.), and are simply tailored to be appropriate for adults [13, 49]. New approaches such as mindfulness and acceptance and commitment therapy (ACT) are also being tested with adults who have migraine [50]. Studies exploring face-to-face delivered CBT to adults for migraine management also support its effectiveness in reducing migraine frequency and intensity. While such results are encouraging, findings also indicate that in general adults do not respond to CBT quite as well as youth receiving similar treatment [49]. On average, adults tend to report only moderate responsiveness to CBT treatment in terms of decreases in headache frequency and severity compared to more significant results in children and adolescents [49]. Research suggests that for adults, medication and/or combination of medication and psychological treatment may be most effective for adult migraine treatment.

Conclusions

Migraine characteristics, such as presentation and associated disability overlap significantly between children and adults [7, 13]. As such, migraine treatment is often similar across age groups. Commonly used treatments for migraine in both children and adults include preventative and abortive medications, lifestyle habits, and psychological treatments [7, 12, 26, 44]. Although similar treatments are used to treat migraine in both youth and adults, existing literature suggests that this may not be the best approach for effective treatment. Psychological interventions appear to be more effective in children, while preventative medications may be more useful in adults and can present greater risk than benefit when used in children [13, 24]. The placebo effect is notable in adults and children, and studies that lead to leveraging this impact are needed. Understanding of the common and unique mechanisms of treatments for migraine across the age spectrum is quite limited, and research in this area could have great potential to inform precision-focused care [51-55].

Overall, existing research on migraine treatment suggests that children are not simply ‘little adults’, thus their treatment for migraine should not be handled this way. The principles of evidence-based care and shared-decision making with patients and families strongly suggest that rigorous scientific investigation for treatments is needed to prove their effectiveness and safety in children prior to being used in younger patients with migraine [24, 39].

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