

## Study on Clinical Profile and Triggers of Pediatric and Adolescent Migraine

S. Robert Wilson<sup>1</sup>, R. Lakshmi Narasimhan<sup>2</sup>

### Abstract

**Background:** Migraine tops among the recurrent primary headaches in children and adolescents. Characteristics of migraine in children and adolescents differ significantly from adults. Migraine attacks are precipitated by triggers like dietary, environmental, emotional and behavioral stimuli. Characterization of clinical profile and triggers of migraine will help greatly in managing this group of migraine sufferers.

**Aim of the study:** To study the clinical profile of migraine in children and adolescents and To find out and analyze the common triggers of migraine in them

**Materials and methods Study sample:** Thirty children between 5 to 12 years and seventy adolescents between 13 to 18 years study place: Institute of Neurology, Govt Rajiv Gandhi General hospital and Institute of Child Health. A detailed history is taken from all patients regarding the characteristics of their migraine attacks and a thorough clinical examination was done. A questionnaire containing the common triggers of migraine were provided to them/ their parents in case of children and their responses were recorded.

**Results and analysis:** There were 30 children and 70 adolescents in the study group. Of the total 100 children, 59 were female and 41 were male. Migraine without aura is the commonest type observed in this study. Abdominal migraine was seen in 2 and cyclical vomiting was seen in only 1 patient. Maternal history was more with 83% and paternal was 16%. Most children in the study group had 4 to 8 attacks per month, which falls under the category of mild disability in the migraine disability scales. Almost half of patients had migraine onset below 12 years of age. Migraine with aura forms only a small portion of patients. 9 adolescent girls had menstruation as their trigger factor. Aura is not seen in pediatric patients of this study group. Majority of children had more than one trigger. Most common triggers observed in this study are too much physical activity, changes in routine, skipping meals, sleep disturbances, noisy surroundings and bright lighting conditions. Modern era triggers like mobile games and TV watching play a role in both children and adolescents. Most common dietary triggers in children was found to be chocolate and ice creams.

**Conclusion:** Migraine in children and adolescents differs from adults in several ways. Childhood periodic syndromes like abdominal migraine, cyclical vomiting syndrome are frequent in this population. Under diagnosis of migraine in children may be due to the poor expressibility of headache characteristics by them. Common migraine triggers in our population are noisy environment, excessive physical activity, skipping meals, sleep disturbance and change in the daily routine. Novel triggers like mobile games, video games are important precipitants of migraine attacks in children.

**Keywords:** Migraine; Aura; Disability; Triggers

### How to cite this article:

S. Robert Wilson, R. Lakshmi Narasimhan. Study on Clinical Profile and Triggers of Pediatric and Adolescent Migraine. Int J Neurol Neurosurg. 2019;11(1):71-75.

**Author's Affiliation:** <sup>1</sup>Assistant Professor, Dept. of Neurology, SRM Medical College and Research Centre, Potheri, Chennai, Tamil Nadu 603211, India. <sup>2</sup>Professor and Head, Dept. of Neurology, Institute of Neurology, Govt Rajiv Gandhi General Hospital, Chennai, Tamil Nadu 600003, India.

**Corresponding Author:** R. Lakshmi Narasimhan, Professor and Head, Dept. of Neurology, Institute of Neurology, Govt Rajiv Gandhi General Hospital, Chennai, Tamil Nadu 600003, India.

**E-mail:** [jasonrobby09@gmail.com](mailto:jasonrobby09@gmail.com)

**Received on** 14.10.2018, **Accepted on** 13.12.2018

### Introduction

Headache is the most common illness seen in pediatric and neurology clinics. A systematic approach is mandatory in the evaluation of children and adolescents with recurrent headaches.

The incidence of recurrent or frequent headaches is 2.5 % in 7 yr old and 15% in 15 yr old. Among the recurrent primary headaches in children and adolescents, migraine is the commonest one. The characteristics of migraine in children and adolescents differ significantly from adults in terms of aura, unilaterality, manifestations etc. Migraine has a tendency to be precipitated by various triggers including dietary, environmental, emotional and behavioral stimuli. Characterization of the clinical profile and various triggers of migraine in children and adolescents will help greatly in managing this group of migraine sufferers.

#### *Aim of the Study*

1. To study the clinical profile of migraine headache in children aged 5 to 12 years and adolescents aged 13 to 18 years. 2. To find out and analyze the common triggers of migraine in pediatric and adolescent patients with migraine.

#### **Materials and Methods**

*Study centre-* Department of Neurology, Institute of Child Health, Egmore and Headache clinic, Institute of Neurology, Madras Medical College and Rajiv Gandhi Government General hospital, Chennai. Study design-cross sectional study.

*Study period-* August 2013 to February 2015.

*Study sample-* Thirty children between 5 to 12 years of age who attended pediatric neurology op at institute of child health and seventy adolescents between 13 to 18 years of age who attended headache op at Institute of Neurology, Madras Medical College for follow up of their migraine.

*Inclusion criteria-* Children between 5 to 12 years of age with history suggestive of migraine headache, with at least 4 attacks of migraine in the past 3 months and adolescents between 13 to 18 years of age with history suggestive of migraine headache, with at least 4 attacks of migraine in the past 3 months were included.

*Exclusion criteria-* Those patients found to have atypical headache features and whose evaluation revealed secondary headache and children and adolescents with migraine who have more than 15 attacks/month or less than 4 attacks in the past 3 months and with other co-morbid neurological conditions were excluded. Children and adolescents with complicated migraine like chronic migraine or status migrainosus or migraine with infarction were also excluded.

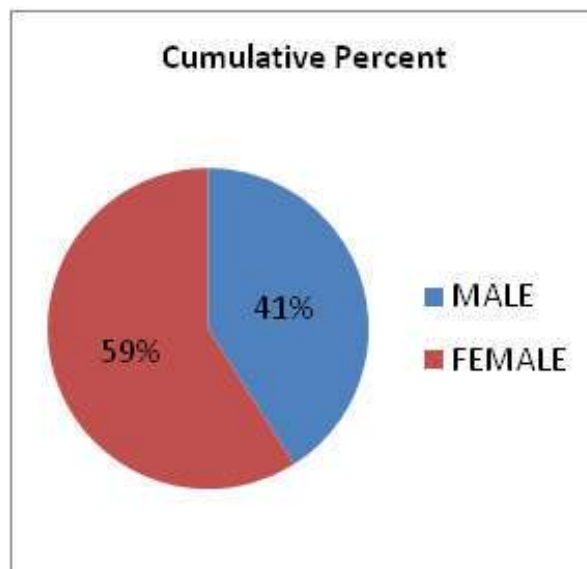
*Evaluation of patients-* Patients were grouped into children and adolescents depending on their age. Those with atypical features of headache were subjected to neuroimaging and other investigations. A detailed history is taken from all patients regarding the characteristics of their migraine attacks and a thorough clinical examination was done. A questionnaire containing the common triggers of migraine were provided to them/ their parents in case of children and their responses were recorded. A trigger was considered positive if it consistently produces headache in at least 3 occasions and within 48 hours.

Migraine diagnosis and subtyping was done according to the ICHD 3 BETA.

Migraine severity was assessed by MIDAS (migraine disability assessment test) and ped MIDAS scales.

#### **Results and analysis**

All the data were analyzed statistically using SPSS software.



**Graph 1:**

There were 30 children and 70 adolescents in the study group. Of the total 100 children, 59 were female and 41 were male.

Table 1 shows the distribution of types of migraine. Migraine without aura is the commonest type observed in this study. Abdominal migraine was seen in 2 patients and cyclical vomiting was seen in only 1 patient. Maternal history was more with 83% and paternal was 16%. One patient had no family history. Most children had 4 to 8 attacks

per month, which falls under mild disability in the migraine disability scales. In this study group migraine onset was mostly around 10 to 12 years of age. Almost 40 % of patients had migraine onset between 10 to 13 years of age. The next peak age of onset is seen around 5 to 6 years of age. Almost half of patients had migraine onset below 12 years of age. Only one patient had migraine onset at 4 yrs of age. Migraine with aura forms only a small portion of patients. None below 12 years of age reported aura. 13 had visual aura and 4 had somatosensory aura.

Graph 2 shows the distribution of cases among various subtypes of migraine

Most of the adolescents with aura had an aura duration of 10 to 20 minutes. Only one patient had aura for 30 minutes. Aura is not seen in the pediatric patients. In migraine without aura, the majority of patients fall under the mild disability with an attack frequency of 4 to 10 attacks per 3 months. Whereas in patients with migraine with aura, the proportion of patients with moderate disability is more than

**Table 1:** Type of Migraine

ICHD type	Frequency	Percent	Valid Percent	Cumulative Percent
1.1 Migraine without aura	83	83.0	83.0	83.0
1.2 Migraine with aura	14	14.0	14.0	97.0
1.6.1.1 CVS	1	1.0	1.0	98.0
1.6.1.2 AM	2	2.0	2.0	100.0

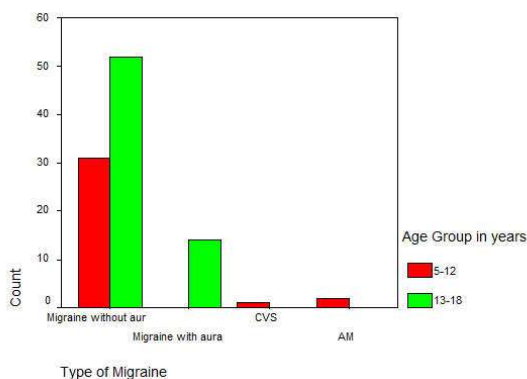
**Table 2:** Migraine Severity

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Mild	70	70.0	70.0	70.0
Moderate	29	29.0	29.0	99.0
Severe	1	1.0	1.0	100.0
Total	100	100.0	100.0	

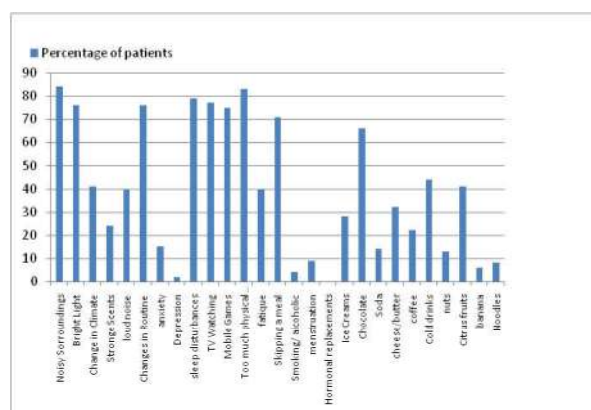
Among patients with aura, the duration of aura is mostly between 10 to 20 minutes. None had aura for more than 30 minutes. 70 % of patients fall under the category of mild disability and 29 % had moderate disability and only one patient had severe disability with 30 attacks of migraine in the past 3 months. 9 adolescent girls had menstruation as their trigger factor.

patients without aura. Almost 50% of patients with aura had moderate disability whereas only 26% of patients without aura had moderate disability. One patient with cyclical vomiting syndrome and another two patients with abdominal migraine had mild disability from their migraine.

Table 2 shows the number of patients in each type of migraine. Majority of cases were having migraine without aura. Nobody in the age group of 5-12 had aura.



**Graph 2:**



**Graph 3:** Number of patients per trigger

Graph 3 shows the common triggers observed during this study. Majority of children had more than one trigger. Some triggers are more common in adults and some triggers are more prevalent in children. The most common triggers observed in this study are too much physical activity, changes in routine, skipping meals, sleep disturbances,

noisy surroundings and bright lighting conditions. Modern era triggers like mobile games and TV watching also plays a role in both children and adolescents. The most common dietary trigger in children was found to be chocolate and ice creams. Triggers determine migraine disability to a great extent. Thereby, control of triggers should be given adequate importance in order to get a good migraine control.

## Discussion

Of the 100 participants included in this study, 30 were children and 70 were adolescents. Prevalence of migraine is lesser in children than in adolescents, but a large proportion of patients has headache onset in late childhood. 75% of patients had their headache onset before 12 years of age. It was found out that the initial episodes in this children appear nonspecific and do not fit with the ICHD criteria and also these episodes are often overlooked and there is usually a latency period of several years before they are diagnosed as migraine. Females predominated in both age groups. In children, female:male ratio is 1.3:1 and in adolescents 1.5:1. After puberty, the number of females affected becomes more which is consistent with other studies. Even though females outnumber males, the severity is the same for both sexes. Most common type of migraine found in this study group was migraine without aura, found in 86% of study people. No child (less than 12 years) in the study group reported an aura. All cases of migraine with aura is from the adolescent age group. Markus Schurks et al., in the women's health study has reported aura in 39% of adolescent girls. Aura was seen in 18% of adolescent girls in our study. It was found that children are poor in expressing their migraine characteristics including aura. They are incapable of describing their headache characteristics in detail. Adolescents in contrast describe their auras well and migraine with aura was seen in 14 adolescents in our study. Abdominal migraine was diagnosed in 2 children. Although there was a history suggestive of abdominal migraine in childhood in 11 patients, during the study period, only two met the diagnostic criteria for abdominal migraine. A change to another migraine type was observed in those 11 patients. Recurrent acute abdominal pain was very common in the 5 to 12 age group, but most of these did not fit with the criteria for abdominal migraine. Few studies quote that 4 to 10% of acute, recurrent abdominal pain in this age group is of migrainous nature. Cyclical vomiting was seen in only one patient. Also several

children gave history of recurrent episodes of vomiting, with some periodicity, but not meeting the criteria for cyclical vomiting syndrome. It is advisable that cyclical vomiting syndrome and abdominal migraine should be considered in all cases of recurrent vomiting and abdominal pain even if they do not meet the criteria for these syndromes, especially if there is a strong family history of migraine and no other accountable cause is found during the evaluation. History suggestive of benign paroxysmal vertigo was found in 6 children. Children with features suggestive of periodic childhood syndromes should be followed up as they are prone to develop one of the migraine subtypes during adulthood. Most of the patients in this study had their mother affected with migraine. Family history was invariably positive in this group of young migrainours. This has to be confirmed by further studies. Paternal migraine history was positive only in 16 cases. In almost three fourth of these patients, the onset of migraine was before the age of 12 years, even though the age at diagnosis was in adolescence. The causes of delayed diagnosis may be due to the non specific nature of their headaches during the early time period. In any recurrent headache, migraine should be considered if there is strong family history and there is no accountable causes for their headache, even if the headaches do not satisfy the full criteria. The severity of migraine is largely determined by the attack frequency. Most of the patients in this group had 4 to 10 attacks per month which corresponds to mild degree of disability in MIDAS scale. 21 out of the 100 patients had an attack frequency of more than 10 episodes per month. Only one patient suffered from severe disability with a frequency of 15 attacks per month. Prodromal phase has been observed in 69% of patients. Irritability was the most common prodrome observed in this group followed by lethargy. No correlation has been found between the type of prodrome and age or sex of the patients. In this study 14 adolescents had migraine with aura. Visual aura is the most common form of aura found in this study, followed by somatosensory aura in 4. Most common visual aura described was negative scotoma-darkening of vision. No patient reported motor, language or psychic aura. Unlike adults, migraine with aura forms only a minor portion of this study group. Duration of aura was 10 to 20 minutes in most of the individuals. The character of headache also differs from adults. Most of them reported nonspecific, holocranial headache, instead of the throbbing or pulsatile nature. This is especially true of children below 12 years of age. Unilaterality of

the headache also was rare in the study group. The degree of disability of migraine was categorized as mild, moderate and severe according to the MIDAS and ped MIDAS scale. One third of patients were in the moderate degree with 10 to 30 days of loss of school, home and social activities in the past 3 months. Most of the children had mild disability whereas most of the adolescents had moderate disability. Triggers play an important role in causing disability. Triggers have been grouped into environmental, emotional and behavioral, hormonal and dietary. Number of triggers present in each individual varies considerably. And the triggers for each group were different. Studies on triggers of migraine in under 18 are very few. The type of triggers, especially the dietary ones differ between our population and western. Modern day triggers like video games and mobile games are worth mentioning. A total of 26 trigger factors were analysed. A trigger factor was considered positive if it consistently precipitated migraine attacks on at least 3 occasions. A noisy environment was the most frequent trigger identified in this study which was found in almost 84 percent of individuals. The next common trigger was too much physical activity which was particularly prominent in adolescents. This is in accordance with previous studies on prevalence of triggers in this age group. The other triggers in descending frequency are bright lighting conditions, skipping meals, and any change in the routine activities. Most often adolescents get migraine because of skipping breakfast. Study by Hauge et al., reported stress as the commonest trigger in adolescents followed by sleep disturbances.

Behaviors like prolonged TV watching and indulging in mobile games for long times are also important triggers. These play a role in adolescents as well as in children in causing precipitance of migraine attacks. The current era children by their nature of spending more time in mobile games and TV watching become vulnerable to recurrent migraine attacks and they suffer loss of school days and social functioning. Sleep disturbances play a major role in precipitating migraine attacks in this study population. In around 60 percent of children and 90 percent of adolescents sleep disturbance was one of the trigger for their migraine headaches. Several other studies in the literature also quote a similar figures for these triggers. Change in climate or hot climate was found in 41 percent of the study group. One important trigger in adolescent girls in this study was menstruation. Migraine attacks may occur in several temporal profiles with the menstrual cycle, premenstrual or during

the menstrual flow commonly. This trigger was found in 9 adolescent girls in this study. L C Turner et al when studying the trigger factors among the Mexican-American population in San Diego found out that menstruation was a trigger factor in 53 % of adolescent girls. Strong scents were also reported as triggers in this study group, found in approximately 24 out of the 100 of individuals. In a study by Silva Neto et al., strong odors were triggers in 70% of study people. Perfumes and paints were the most common odorous triggers in that study group. Some of the other triggers in this study group are anxiety and fatigue. Depression as a feature was included in the questionnaire, but nobody in this study group had depression. Other studies in the literature also revealed similar results. Dietary factors play a major role in triggering the migraine attacks especially in younger children. Chocolate was a very common trigger in both adolescents as well as children. Avoidance of chocolates helps greatly in reducing the number of attacks thereby reducing the disability associated with migraine. Citrus fruits have been a trigger factor in a significant number of children in this study group. Cola drinks are also a major trigger in adolescents. Cheese and ice creams are the other triggers in our study group. The western literature mentions hot dogs, pizza, and preserved meat as common trigger factors but these are not consumed often in the majority of our children. Dietary factors which commonly precipitate migraine; do so within few hours of taking the offending food item. Maintaining an electronic headache diary will help in identifying the dietary triggers as well as in assessing the effectiveness of elimination diets. Many of the study group children were already taking these elimination diets. Nuts are triggers in adult migraine as well as children and adolescents. In our study almost 40 percent of the participants had nuts as one of the triggers. Some triggers are more common in adolescents than in children and vice versa. The triggers which are operative in adolescents predominantly are too much physical activity, skipping meals, noisy surrounding, sleep disturbance, bright light, changes in routine, TV watching and mobile games. Study by Anne Werner Hauge et al., identified too much or excessive physical activity was the most common trigger in adolescents followed by bright sunlight and lack of sleep [15]. The triggers found predominantly in children are dietary like icecream and chocolate eating. These consistently produce migraine attacks in certain individuals. Dietary factors are easy to modify in adolescents but it is difficult to implement elimination diet in small

children. Several individuals in this study group have multiple trigger factors, some having as much as all the triggers mentioned in the questionnaire. The degree of disability as assessed by the MIDAS scales is very well correlated with the number of trigger factors possessed by the individuals.

### Conclusion

Migraine is the most common cause of acute recurrent headaches in children and adolescents. Migraine in children and adolescents differs from adults in several ways. Childhood periodic syndromes like abdominal migraine, cyclical vomiting syndrome are frequently seen in this population. Atypical presentation of these syndromes are more common. High index of suspicion is needed for the diagnosis of these childhood syndromes. Maternal history is more important in childhood migraine than paternal history. Under diagnosis of migraine in children may be due to the poor expressibility of headache characteristics by them. The most prevalent triggers for the migraine in this study group are environmental, dietary followed by emotional and behavioral triggers. Common triggers in our population for migraine are noisy environment, excessive physical activity, skipping meals, sleep disturbance and change in the daily routine. Alcohol was noted to be a trigger in 4 adolescents. Novel triggers like mobile games, video games are important precipitants of migraine attacks in children. The exact impact of these triggers on childhood migraine requires further studies. We feel that pediatric population would require modification of criteria for migraine including all these variabilities.

### References

1. Debney LM, Hedge A. Physical trigger factors in migraine-with special reference to weather. In: Amery WK, Wauquier A, editors. *The prelude to the migraine attack*. London: Balliere Tindall, 1986:8-23
2. Silberstein SD. The role of sex hormones in headache. *J Pain Sympt Man*. 1993;8(2):98-114
3. Rexrode KM, Lee IM, Cook NR, Hennekens CH and Buring JE. Baseline characteristics of participants in the Women's Health Study. *J Womens Health Gend Based Med*. 2000;9:19-27.
4. Johannes CB, Linet MS, Stewart WF, Celentano DD, Lipton RB and Szklo M. Relationship of headache to phase of the menstrual cycle among young women: a daily diary study. *Neurology*. 1995;45(6):1076-1082
5. Robbins L. Precipitating factors in migraine: a retrospective review of 494 patients. *Headache* 1994;34(4):214-16.
6. Winner P., Lewis D., Rothner A.D. *Headache in Children and Adolescents*, 2nd edition, Hamilton, Ontario: BC Decker, Inc.; 2008.pp.1-322.
7. Cephalalgia. A comprehensive criteria set for all headache disorders, divided into primary and secondary disorders. 2004;24:1-160.
8. Powers SW, Patton SR, Hommel KA, Hershey AD. Quality of life in childhood migraines: Clinical impact and comparison to other chronic illnesses. *Pediatrics*. 2003;112:e1-e5.
9. Turner LC, Rothrock JF, Molgaard CA. A neural shift theory of migraine. *Neuroepidemiology*. 1993;12:249-50
10. Rasmussen BK. Migraine and tension-type headache in a general population: precipitating factors, female hormones, sleep pattern and relation to lifestyle. *Pain*. 1993;53(1):65-72
11. Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. *Cephalalgia* 1988;7 Suppl 8:1-96
12. Lipton RB and Bigal ME. The epidemiology of migraine. *Am J Med*. 2005;118(Suppl 1):3-10.
13. Kelman L. The triggers or precipitants of the acute migraine attack. *Cephalalgia*. 2007;27:394-402.
14. Rexrode KM, Lee IM, Cook NR, Hennekens CH and Buring JE. Baseline characteristics of participants in the Women's Health Study. *J Womens Health Gend Based Med* 2000;9:19-27.
15. Chu ML, Shinnar S. Headaches in children younger than 7 years of age. *Arch Neurol*. 1992;49(1):79-82.
16. Turner LC, Rothrock JF, Molgaard CA. A neural shift theory of migraine. *Neuroepidemiology* 1993;12:249-50.
17. Queiroz LP, Peres MFP, Piovesan EJ, et al. A nationwide population-based study of migraine in Brazil. *Cephalalgia*. 2009;29:642-49.
18. Fukui PT, Gonçalves TR, Strabelli CG, et al. Trigger factors in migraine patients. *Arq Neuropsiquiatr* 2008;66:494-99.
19. Spierings EL, Ranke AH and Honkoop PC. Precipitating and aggravating factors of migraine versus tension-type headache. *Headache*. 2001;41: 554-58.
20. Friedman DI and De ver Dye T. Migraine and the environment. *Headache*. 2009;49:941-51.
21. Zagami AS, Bahra A. Symptomatology of migraines without aura. In: Olesen J, Goadsby PJ, Ramadan NM, Tfelt-Hansen P, Welch KM (eds) *The headaches*, 3rd edn. Philadelphia, PA: Lippincott

- Williams & Wilkins, 2006.p.399-405.
22. Chabriat H, Danchot J, Michel P, Joire JE, Henry P. Precipitating factors of headache. A prospective study in a national control-matched survey in migraineurs and nonmigraineurs. *Headache*. 1999; 39:335-8.
  23. Holzhammer J, Wober C. Alimentary trigger factors that provoke migraine and tension-type headache. *Schmerz*. 2006;20:151-9.
  24. Robbins L. Precipitating factors in migraine: a retrospective review of 494 patients. *Headache* 1994;34:214-6.
  25. Rasmussen BK, Olesen J. Migraine with aura and migraine without aura: an epidemiological study. *Cephalalgia*. 1992;12:221-8.
-