

Recurrent Headache in Indian Adolescents

Ravi Gupta, Manjeet Singh Bhatia, Devendra Dahiya, Sameer Sharma, Rahul Sapra, Kapil Semalti and Raman Preet Singh Dua

Department of Psychiatry, University College of Medical Sciences and GTB Hospital, Delhi, India

ABSTRACT

Objective. To analyze the epidemiology and characteristics of primary recurrent headaches in Indian adolescents. **Methods.** This cross sectional study was conducted in three urban public schools. Adolescents of 9th to 12th grades were included and they were given a questionnaire in their classrooms in the presence of at least one of the authors, who assisted them in filling it. They were asked to provide responses based on most severe recurrent headache they had experienced rather than the more frequent one. Diagnosis was based upon the information contained in questionnaire, however, where it was inadequate, those subjects were approached telephonically. Statistical analysis was done with the help of SPSS v. 11.0. Descriptive analysis, Chi-Square test, Fisher's Exact test, and independent sample 't' test were run. **Results.** We studied 2235 adolescents (boys: girls 1.6:1). 57.5% adolescents reported recurrent headaches in past one year. Migraine was the most prevalent (17.2%) headache followed by unspecified (14.9%) and tension type headache (11%). Family history of headache was more common in adolescents with headache ($p < 0.001$) compared to those without headache. Average age of headache onset was 11.33 yr (10.72 yr in girls vs. 11.75 years in boys; $p < 0.001$). 37.1% adolescents complained of progression of headache since its onset. A significantly higher proportion of girls suffered headache ($p=0.018$), particularly migraine, than boys. However, other characteristics of headache were not dependent upon gender. Headache was more prevalent in higher grades. **Conclusion.** Primary recurrent headaches are prevalent in Indian adolescents and migraine is comparatively the most prevalent type of headache. Female gender and increasing age is associated with higher chances to have headache, particularly migraine. It progresses in approximately one third of sufferers and aura increases the chances of worsening of headache. [Indian J Pediatr 2009; 76 (7) : 733-737] E-mail: guptaravi_2003@yahoo.co.in

Key Words : Recurrent headache; Adolescents; Prevalence

Headache is a common complaint in children.^{1,2} Headache is a major health concern not only because it is a disabling disease,³ but also because of high utilization of health care system and due to work absenteeism.⁴ World Health Organization has given the disability score of 0.7 to migraine³ and according to them it is one of the most debilitating illnesses. Moreover, adolescents with headache prefer taking analgesics themselves over visiting a physician^{5,6} and this may lead to development of medication overuse headache which is refractory to most of the available treatments.

Previous studies differ regarding the overall prevalence of primary headaches in children and also regarding the type of primary headaches.³ While some

studies had described migraine as the most prevalent headache in adolescents,⁷ other studies have found tension type headache to be the most common type.^{3,8} A recent review suggested that despite high prevalence of headache throughout the world, most of the epidemiological studies were conducted in Western Europe and North America.³

In India, only two studies are available-regarding primary headaches one was conducted in adolescents in school that assessed migraine only,⁹ and another in the children and adolescents attending headache clinic.¹⁰ Hence, present study was designed to assess the epidemiology and characteristics of primary headaches in Indian adolescents.

MATERIAL AND METHODS

Sample size for this study was calculated with the help of Epi-Info v. 3.3.2. Considering the available literature, size was calculated using 47% as the prevalence of current headache³ (worst acceptable limit 45%) with

Correspondence and Reprint requests : Ravi Gupta, 1061, Kissan Marg, Barket Nagar, Jaipur - 302 015, India Phone No: 9799-611-411

[DOI-10.1007/s12098-009-0112-3]

[Received March 23, 2008; Accepted May 21, 2008]

99% confidence interval. In the resultant 2032 subjects, 10% was added to compensate for expected 'non-usable' response-sheets, based on our experience with similar population based studies. All students of grades ninth to twelfth from three schools, which provided their oral consent were included in this study after seeking consent from the school authorities. Before including in the study, health records of all the students (available in respective schools) were screened for the presence of any chronic medical illness that might cause secondary headache. This information was corroborated with the information acquired from the students and where there was an agreement between the two, such subject was excluded. Similarly, students who did not have at least three headaches and those who did not remember its character were also excluded from the study.

Rest of the students were explained the purpose of the study by authors in the presence of school physician and school authorities. They were encouraged to participate and provide reliable information after taking their oral consent.

This was a questionnaire based study based on ICHD-2 diagnostic criteria¹¹ for various primary headaches besides questions asking demographic data, duration of headache and change in its severity, frequency and duration since onset, age of onset of recurrent headache. Other questions related to headache were- quality of pain, usual time of onset of headache, diurnal variation in headache, duration of each episode, frequency of headache episodes, precipitating, aggravating and relieving factors *etc.*

The questionnaire has proven effective for the diagnosis of headache and their categorization according to ICHD-2 in clinics (will be published separately). The questionnaire was distributed to 2455 students in their classrooms and at least one of the authors read it aloud in front of them. At the outset, they were instructed not to fill the characteristics of headache that they experience during cold, dental pain, fever *etc.* Each item of the questionnaire was explained sequentially and students' queries, if any, were resolved immediately. If any student suffered more than one type of headache, he was instructed to fill the responses according to one, which was more disabling and causing considerable discomfort.

Questions regarding family history of 'primary recurrent' headaches were answered by the students. Since the students were older enough, in the Indian family-settings, such information is not only available to children but, is also reliable. Similarly, overuse of drug and caffeine was diagnosed according to ICHD-2 criteria provided in substance overuse headache. Diagnosis of all the cases was made afterwards according to the ICHD-2 criteria. Wherever the

information was found insufficient, respective student was contacted telephonically and a clarification was sought. Acquisition of telephonic information was based on the diagnostic criteria provided in ICHD-2 for adults.

SPSS v 11.0.0 was used for the analysis of data. For assessment of frequencies in the sample descriptive statistics was run. Chi Square test or Fisher's exact test were used to find out the differences in frequencies between categorical variables. To find out differences between genders independent sample t test was run.

RESULTS

In the present study, a total of 2563 students were included. In this sample sixty-seven students were suffering from recurrent cold, myopia and other problems that could cause headache; forty-one did not provide consent to participate in the study, and two hundred twenty forms did not contain enough information to reach a conclusion. Hence, remaining 2235 response sheets were finally analyzed (Fig 1).

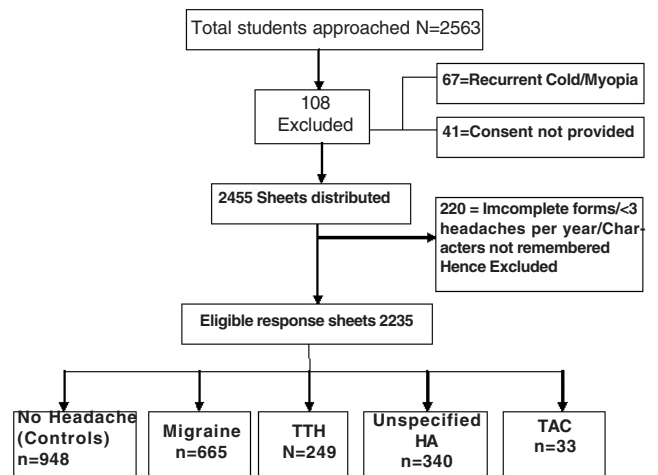


Fig. 1. Diagram showing constitution of the sample of the study.

Boys and girls were present in the ratio of 1.6:1 in study sample. Similarly, boys outnumbered girls in all schools; this was natural ratio of genders in the schools due to social reasons. The difference in mean age of the boys and girls was clinically not considerable (15.40 years to 15.06years respectively).

57.5% students of this sample complained of having recurrent headaches in previous one year. Migraine was most prevalent in the sample with one-year prevalence of 17.2% (after excluding probable migraine) followed by unspecified headache (14.9%) and tension type headache (11%). Further categorization is shown in table 1.

Recurrent Headache in Indian Adolescents

TABLE 1. Diagnosis of Various Headaches in the Sample (N=2235)

S. No.	Diagnosis Sample	Percent	Cumulative Percent
1.	No Headache	42.5	42.5
2.	Migraine		
a.	Migraine without aura	7.3	49.8
b.	Migraine with aura	2.3	52.1
c.	Probable Migraine without aura	6.8	58.9
d.	Probable migraine with aura	0.9	59.7
e.	Migraine with aura + Migraine without aura	7.6	67.3
f.	Probable Migraine with aura + Probable Migraine without aura	4.9	72.2
3.	Unspecified Headache	14.9	87.1
4.	Tension Type Headache		
a.	Episodic Infrequent Tension Type Headache	7.6	94.7
b.	Episodic Frequent Tension Type Headache	3.2	97.9
c.	Chronic Tension Type Headache	0.2	98.1
d.	Probable Tension Type Headache	0.1	98.2
5.	Trigeminal Autonomic Cephalalgia		
a.	Probable Cluster Headache	0.8	99
b.	Cluster Headache	0.3	99.3
c.	Probable Paroxysmal Hemicrania	0.3	99.6
6.	Primary Stabbing Headache	0.4	100

Prevalence of headache was higher in girls as compared to boys (60.6% and 55.5% respectively; $X^2=5.58$; $P=0.01$). Family history of headache is depicted in table 2.

Boys and girls had the ratio of 1.4:1 in this group. Among headache sufferers, mean age of adolescents was 15.37 yr (range 12-19 yr). Total duration of illness was 1.47 ± 1.7 yr, average age of onset was 11.33 ± 5.32 yr and mean duration of headache episodes was 4.23 hr. These adolescents suffered four headaches per month on an average. Gender and grade-wise distribution of age of onset is depicted in Fig 2. 37.1% sample reported that headache had become disabling since onset however, gender did not influenced it. Among these, 15.7% complained of increased severity, 20.9% increased frequency and 16.6%

TABLE 2 Family History of Headache in the Sample

Family History of headache	Headache	
	Absent	Present
Absent	99.3%	71.3%
Mother	0.3%	16.7%
Father	0.3%	5.3%
Both Parents	-	3.1%
Siblings	0.1%	3.6%

$X^2= 305.8$; $p<0.001$

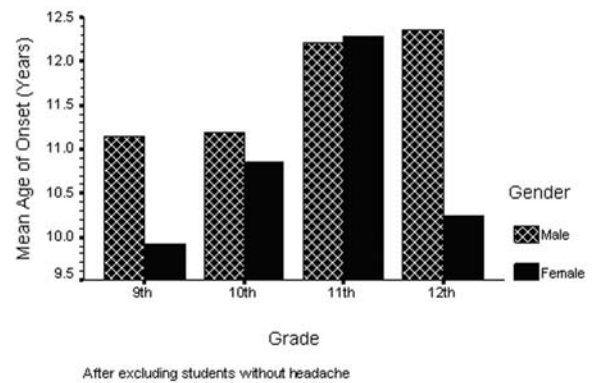


Fig. 2. Age of onset of headache in different grades.

complained of increased duration of headache. Fig 3 shows progression in headaches. 13% students reported caffeine overuse and 0.5% were habitual to smoking.

Gender dependent distribution of each headache is depicted in table 3. Age of onset ($t=3.35$; $P=0.001$) of headache was nearly one year less in girls as compared to boys (10.72 yr vs. 11.75 yr in boys; $P < 0.001$). In this sample headache was more frequent in higher grades ($X^2 = 25.37$; $P<0.001$).

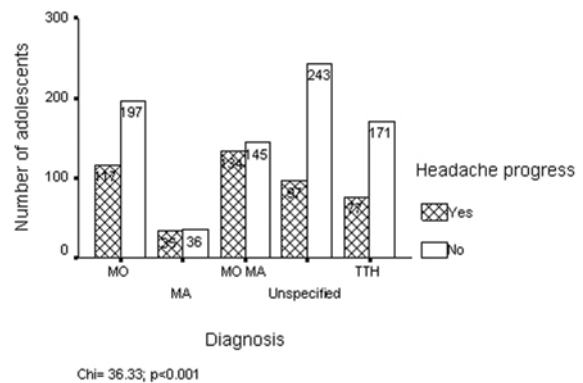


Fig. 3. Progression of headache according to the diagnosis.

DISCUSSION

This is the first epidemiological study ever conducted for the assessment of prevalence of primary headache in Indian adolescents. Though clinical interview is considered gold standard,¹²⁻¹⁴ still many epidemiological studies have used the questionnaires as a source of information for the diagnosis of headache.^{2,6,8} Evidences suggest that questionnaire based studies are not only feasible, but also provide reliable information.¹⁵⁻¹⁶ Moreover, clinic based studies are prone to selection bias and face-to-face interviews with clinical examination are extremely difficult to be conducted in

TABLE 3 Prevalence of Headaches According to Age and Gender

Age (Years)	Diagnosis				
	No Headache	Migraine*	Unspecified	TTH	TAC*
Boys (N=1379)					
12-13 (N=102)	58.8%	18.6%	10.8%	8.8%	2.9%
14-15 (N= 673)	45%	29.1%	15%	9.2%	1.6%
16-17 (N=573)	41.3%	27.3%	16.5%	13.4%	1.5%
18-19 (N=21)	38.1%	28.6%	19%	14.3%	-
Girls (N= 856)					
12-13 (N=76)	52.6%	31.6%	7.9%	7.9%	0
14-15 (N=431)	41.8%	31.1%	14.2%	12.5%	0.5%
16-17 (N=337)	33.2%	36.5%	17.5%	10.4%	2.4%
18-19 (N=12)	33.3%	33.3%	16.7%	16.7%	0

TTH = Tension type headache; TAC = Trigeminal Autonomic Cephalgia

large population based studies. Hence, we preferred the questionnaire based study with telephonic interview of adolescents wherever required.

In the present study one year prevalence of recurrent headaches was comparable with a few of the previous studies, which have shown one year prevalence of recurrent headaches in adolescents to vary from 19% to 82.9%.^{1,2,8,17} Such a wide variation might have resulted from difference in the methodology and geographical area where they were conducted³ and could also be related to the suggestibility in school children.¹⁸ Age and gender influenced the prevalence of headache as students of higher grades had more frequent headaches. This supports the findings of previous studies which described higher frequency of headache, specifically migraine in girls^{2,5} as well as the escalating trend of headache with the age in adolescents.¹ The age of onset of primary headaches is reported to be 12.7 yr in boys and 12.9 yr in girls.⁵ However, subjects in the present study reported headache onset at relatively younger age *i.e.*, 10.72 yr in girls and 11.75 yr in boys as compared to previous report.⁵ A significant proportion of subjects had positive family history of headache in first-degree relatives; therefore, we wondered if 'anticipation' was responsible for this! Hence, we reanalyzed the data, but did not find any difference in the age of onset of illness between those with and without family history of headache. On the contrary, subjects with positive family history developed headache at slightly older age.

In the present study, migraine was most frequent primary headache followed by unspecified headache and tension type headache. It differs from the findings of most of the previous studies^{8,13,17,19} which report prevalence of migraine from 6.2% to 10.4% and in a recent review,³ which concluded that tension type headache is most common headache in children. Higher prevalence of migraine in the present study compared to other studies could have resulted because

we instructed the students to report the headache which was more disabling rather than more frequent one. Definition criteria that we had used could also be responsible for disparity as most of the studies that describe lower prevalence of migraine in adolescents than other headache were conducted prior to the publication of ICHD-2^{8,13,17,19} and included relatively younger children.^{8,13} Contrarily, one recent study that had followed ICHD-2 criteria¹¹ also reported higher prevalence of migraine.⁷ In addition, a substantial number of children diagnosed of tension type headache in at least one previous study suffered nausea, pulsating headache, phonophobia and even photophobia.⁸ In the present study subjects with migraineous characters not qualifying the diagnosis of probable migraine were assigned to the category of 'unspecified headache', thus resulting in higher frequency of this category.

Previously reported prevalence of tension type headache in children ranging from 5-15 years age is 0.9%,¹⁴ however, in a study whose age group matches the present study, prevalence was found to be 18%.² Another study reported that most common type of headache in adolescents was tension type headache (24.7%), although as already mentioned many cases of tension type headache in that study had migraineous characters.⁸ Most common subtype of tension type headache is episodic tension type headache,² a finding also seen during the present study.

More than one third of students reported that headache has progressed since onset; among these, nearly half complained of increased severity and increase in duration of headache episodes, while more than half reported increased frequency of headaches. Migraine with aura had a predilection for progression, however, gender or current of age of adolescents did not impart any effect on it. Factors that influence the progression of headache over time are still unknown and require further research. Guidetti et al. found increase in frequency and/ or severity in 45% cases of primary headache.²⁰

Like the present study, previous studies have reported a high frequency of headache in family members of headache suffering children²¹⁻²² and described highest prevalence of headache in their mothers or *vice versa*.¹ Diagnosis of headache also influenced the family history as migraineurs had the highest prevalence of headache in their family as compared to other headache sufferers. It endorses hereditary transmission of migraine.

CONCLUSION

Headache is prevalent in Indian adolescents and this advocates screening in this age group. Migraine is

Recurrent Headache in Indian Adolescents

comparatively most prevalent in the school-going Children and progresses in a substantial number of children. A high rate of headache sufferer in the family indicated that the primary headaches and migraine in particular, have genetic component.

Contributions: Ravi Gupta, Manjeet Singh Bhatia are involved in inception, designing, statistical analysis, interpretation of data, manuscript writing and critical analysis for intellectual content.

Sameer Sharma, Davinder Dahiya, Kapil Semalti, Rahul Sapra and Ramanpreet Singh Dua are involved in data acquisition, statistical analysis, and manuscript preparation.

Conflict of Interest: Nil

Role of Funding Source: The study was supported by Intas Pharmaceuticals (India) Pvt. Limited.

REFERENCES

1. Virtanen R, Aromaa M, Rautava P *et al.* Changes in headache prevalence between pre-school and pre-pubertal ages. *Cephalalgia* 2002; 22:179–185.
2. Zwart JA, Dyb G, Holmen TL, Stovner LJ, Sand T. The prevalence of migraine and tension-type headaches among adolescents in Norway. The Nord-Trøndelag Health Study (Head-HUNT-Youth), a large population-based epidemiological study. *Cephalalgia*. 2004; 24: 373-379.
3. Stovner LJ, Hagen K, Jensen R *et al.* The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalalgia* 2007; 27:193–210.
4. Vinding GR, Zeeberg P, Lyngberg A, Nielsen RT, Jensen R. The burden of headache in a patient population from a specialized headache centre. *Cephalalgia* 2007; 27:263–270.
5. Suzuki S, Hirata K, Tatsumoto M. The prevalence and character of primary headache in Japanese high school students. *Rinsho Shinkeigaku* 2005; 45: 717-723.
6. Ando N, Fujimoto S, Ishikawa T *et al.* Prevalence and features of migraine in Japanese junior high school students aged 12-15yr. *Brain Dev* 2007; 29: 482-485
7. Kienbacher C, Wöber C, Zesch HE *et al.* Clinical features, classification and prognosis of migraine and tension-type headache in children and adolescents: a long-term follow-up study. *Cephalalgia* 2006; 26; 820–830.
8. Ozge A, Bugdayci R, Sasmaz T *et al.* The sensitivity and specificity of the case definition criteria in diagnosis of headache: a schoolbased epidemiological study of 5562 children in Mersin. *Cephalalgia* 2002; 22:791–798.
9. Shivpuri D, Rajesh MS, Jain D. Prevalence and characteristics of migraine among adolescents: A questionnaire based study. *Indian Pediatrics* 2003; 40: 665-669
10. Chakravarty A. Chronic daily headache in children and adolescents: a clinic based study from India. *Cephalalgia* 2005; 25:795–800.
11. Headache Classification Subcommittee of the International Headache Society. The International Classification of Headache Disorders. *Cephalalgia* 2004;24 (Suppl 1): 1-151
12. Rasmussen BK, Jensen R, Olesen J. Questionnaire versus clinical interview in the diagnosis of headache. *Headache* 1991; 31: 290–295.
13. Mavromichalis I, Anagnostopoulos D, Metaxas N, Papanastassiou E. Prevalence of migraine in schoolchildren and some clinical comparisons between migraine with and without aura. *Headache* 1999;39 :728-736.
14. Abu-Arefeh I, Russell G. Prevalence of headache and migraine in schoolchildren. *BMJ* 1994; 309:765-769.
15. Laurell K, Larsson B, Eeg-Olofsson O. Headache in schoolchildren: agreement between different sources of information. *Cephalalgia* 2003; 23:420–428.
16. Zwart J-A, Dyb G, Stovner LJ, Sand T, Holmen TL. The validity of 'recognition-based' headache diagnoses in adolescents. Data from the Nord-Trøndelag Health Survey 1995–97 – Head-HUNT-Youth. *Cephalalgia* 2003; 23:223–229.
17. Al Jumah M, Awada A, Al Azzam S. Headache syndromes amongst schoolchildren in Riyadh, Saudi Arabia. *Headache* 2002;42: 281-286.
18. Passchier J, Orlebeke JF. Headache and stress in schoolchildren: An epidemiological study. *Cephalalgia* 1985; 5: 167-176
19. Lu SR, Fuh JL, Juang KD, Wang SJ. Migraine prevalence in adolescents aged 13-15: a student population-based study in Taiwan. *Cephalalgia* 2000;20: 479-485.
20. Guidetti V, Galli F. Evolution of headache in childhood and adolescence: an 8-year follow-up. *Cephalalgia* 1998; 18: 449–454.
21. Aromaa M, Rautava P, Helenius H, Sillanpää M. Factors of early life as predictors of headache in children at school entry. *Headache* 1998; 38: 23–30.
22. Congdon P, Forsythe W. Migraine in childhood: a study of 300 children. *Dev Med Child Neurol* 1979; 21: 209–216.