

## RESEARCH ARTICLE

### MIGRAINE IN IRANIAN CHILDREN; WHICH CRITERIA ARE THE BEST DIAGNOSTIC CRITERIA?

A. Chitsaz MD<sup>1</sup>,  
A. Ghorbani MD<sup>1</sup>

#### Abstract:

##### Objective

The aim of this study was to identify the best criteria for diagnosis of migraine in our pediatric population.

##### Materials and Methods

A total of 85 children aged below 15 years who had been referred to the Neurology Clinic of Al-Zahra Hospital with headache as their chief complaint, were enrolled. Validated questionnaires were completed by them. The patients were evaluated using five sets of diagnostic criteria including the Vahlquist, the Prensky, the International Headache Society (IHS), the IHS-Revised (IHS-R), and the Maytal criteria; the sensitivity of each set of criteria was assessed.

##### Results

Of the 85 children, clinically diagnosed as having migraine, 61 (72%), 73 (86%), 75 (88%), 76 (89.5%), and 76 (89.5%) met the criteria of IHS, Vahlquist, Prensky, IHS-R, and Maytal, respectively. Both the IHS-R and Maytal criteria had the highest, while the IHS criteria had the lowest sensitivity. Fifty-four children (63.5%) were positive for all five sets of criteria. The application of IHS criteria for diagnosing pediatric migraine led to a smaller percentage of children with migraine being identified.

##### Conclusion

Assessment of the sensitivity of the five sets of criteria for the diagnosis of migraine revealed the inadequacies and limitations of the IHS criteria in the diagnosis of pediatric migraine.

**Key words:** Migraine, Child, Diagnosis, Headache.

#### Introduction

Migraine is a periodical headache of hereditary background with its onset in childhood, adolescence, or early adulthood and recurrences in later years (1). Chronic daily headaches in children differ greatly to the adult type; in children there is a co-existence of migraine and the tension type headache (2-4). Migraine headaches are relatively common in children and the prevalence and sex predilection of migraine headaches vary at different ages (5,6), with the diagnostic criteria being similar to those used in adults, such as throbbing and usually one-sided headaches that occur with varying intensities and durations. The condition is associated with nausea, vomiting, photophobia, phonophobia, and ache-free periods (7,8). It is important, however, to differentiate between childhood migraine and the adult type; differences mainly include the duration of migraine attack, which is often shorter in children and the location of the attack, which may be bilateral in many children

1. Associate Professor of  
Neurology, Isfahan University  
of Medical Sciences  
Corresponding Author:  
Ahmad Chitsaz MD  
Tel: +98 913 316-2677  
E-mail:abbaset4@yahoo.com

(9-11). Migraine attacks in children are extremely painful and most children continue to have headaches twenty years after the diagnosis of pediatric headache (12,13). Children with migraine lose more school days in a year than matched control groups (14,15) and the quality of life (QOL) is significantly affected by their health condition. The relatively poor quality of life (QOL) of children afflicted with migraine is comparable to that of children suffering with arthritis and cancer; this together with the rising prevalence of pediatric migraine and the significantly high costs, make timely and precise diagnosis vital for the correct management of this disorder (16-20). Over the past three decades, several diagnostic measures have been proposed for pediatric migraine including serial headache drawings by children and different clinical criteria (21-24). The first criteria for diagnosis of pediatric migraine were proposed in 1955 by Vahlquist (25) and in 1979, other criteria were proposed by Prensky and Sommer, followed in 1988 by the International Headache Society (IHS) in an attempt to offer a uniform and exhaustive definition for pediatric migraine; in 1996 by Winner and colleagues ( revised IHS (IHS-R) criteria), and Maytal and colleagues (26-29).

In some cases, the clinical diagnosis of pediatric migraine does not match the IHS criteria. Moreover, pediatric migraine variants do not fit IHS definitions. Hence, the IHS diagnostic criteria for pediatric migraine are being questioned (30-32). In spite of the failure to detect many types of migraine, IHS criteria are predominantly considered as the gold standard in the diagnosis of pediatric migraine (28). This descriptive study, carried out to evaluate children, under the age of 15 years, with clinical diagnosis of migraine based on the IHS as well as other criteria, aimed at identifying the best criteria based on the sensitivity of the diagnostic tool.

### Materials and Methods

In this descriptive study, children younger than 15 years, referred to the Neurology Clinic of Al-Zahra University Hospital in Isfahan, with headache as their chief complaint were evaluated. Clinical diagnosis constituted the gold standard. A validated physician-conducted questionnaire was completed for each patient by a single neurologist, and a total of 85 cases with

periodical, throbbing headaches occurring with varying intensities and durations associated with nausea and vomiting, photophobia, phonophobia, and ache-free periods met the gold standard criteria of the clinical diagnosis of migraine and were included in the study. All children were evaluated using five sets of diagnostic criteria (Vahlquist, Prensky, IHS, IHS-R, and Maytal). Sensitivity of each set of criteria was assessed based on the clinical diagnosis of migraine. The following formula was used to calculate the sensitivity:

$$\text{Sensitivity} = \frac{\text{Number of True Positive Cases}}{\text{Number of True Positive Cases} + \text{False Negative Cases}}$$

Inclusion criteria were age less than 15 years, presenting to the Neurology Clinic of Al-Zahra University Hospital with headache as the chief complaint, and confirmation of the diagnosis using clinical history and neurological examination as the gold standard.

We excluded those cases with secondary pathological headaches, primary non-migraine headaches, migraine variants not accompanied by headache, atypical migraine headaches, and the unreliability of the history provided by the patient or the patient's parents. Data was analyzed using SPSS version 11 statistical software. Chi-square test was used to compare qualitative variables.

### Results

Fifty-four (63.5%) patients were male and 31 (36.5%) female; age of onset of migraine ranged between 5 and 15 years. None of the children were younger than 5 years and the highest prevalence of migraine was seen at the ages of 10, 11, and 13 years. Tables 1 and 2 represent the frequency distribution of pediatric migraine criteria according to age and sex.

Of these children, 61 (72%), 73 (86%), 75 (88%), 76 (89.5%), and 76 (89.5%) met the criteria of IHS, Vahlquist, Prensky, IHS-R, and Maytal, respectively. The criteria of IHS-R and Maytal had the highest and IHS criteria had the lowest sensitivity. The difference in distribution of subjects detected by 5 sets of criteria was significant ( $p=0.031$ ). On the other hand, 54 children (63.5%) were positive for all five sets of criteria and one child (1.2%) was positive for only one set of criteria (Prensky). The rest (30 cases), were positive for two,

three, or four sets of criteria (Table 3). Interestingly, both the IHS-R and Maytal criteria detected exactly the same cases and missed only 10.5% of the patients. However, IHS criteria were unable to detect migraine in 28% of the children.

Table 1: The frequency distribution of pediatric migraine criteria according to age

Criteria	AGE										
	5	6	7	8	9	10	11	12	13	14	t15
Vahlquist	1	1	6	3	7	11	12	6	12	6	8
Prensky	2	1	5	3	8	11	12	6	13	6	8
IHS	0	1	5	1	6	7	10	5	10	8	8
IHS-R	1	1	5	2	8	10	13	8	12	8	8
Maytal	1	1	5	2	8	10	13	9	12	8	8

Table 2: The frequency distribution of pediatric migraine criteria according to sex

Criteria	Boys		Girls	
	Frequency	Percent	Frequency	Percent
Vahlquist	49	91	24	77.5
Prensky	50	92.5	25	80.5
IHS	42	78	19	61.5
IHS-R	50	92.5	26	84
Maytal	50	92.5	26	84

Table 3: Positive cases detected by 5 different migraine criteria.

Criteria	Positive Cases	
	Frequency	Percent
All 5 Criteria	54	63.5
Vahlquist, Prensky, IHS-R, Maytal	10	12
Vahlquist, Prensky	8	9.4
IHS-R, Maytal	5	5.9
IHS, IHS-R, Maytal	4	4.7
IHS, Prensky, IHS-R, Maytal	2	2.35
IHS, Vahlquist, IHS-R, Maytal	1	1.1
Prensky	1	1.1

**Discussion**

As compared to the other four sets of criteria, the application of IHS criteria for diagnosis of pediatric migraine led to a smaller percentage of children with migraine being identified; comparing the diagnostic rates for migraine in 55

children, Winner and colleagues showed a sensitivity of 53% for IHS, 69% for Vahlquist, and 80% for IHS-R (33). In a study of 72 children, clinically diagnosed with migraine, Seshia found that only 44 subjects (61%) were completely concordant with the HIS diagnostic criteria (34). Also, Metsahonkala and Sillanpaa compared IHS criteria with five other sets of criteria for the diagnosis of migraine headaches (18,35,36); in one of their studies, 95 and 106 out of 1110 children with headache attacks fulfilled IHS and Vahlquist criteria, respectively, and 83 children met both sets of criteria (35) and in another of their studies, 90.5% of the children diagnosed with migraine headaches according to Vahlquist criteria fulfilled the IHS criteria (35). This figure was 83.5% in our study.

Winner reported a sensitivity of 66% for IHS criteria and an increased sensitivity of 93% when using IHS-R criteria (28). Other studies revealed the inadequacies and limitations of IHS criteria in the diagnosis of pediatric migraine (29, 37-43). The main reason for the difference is that IHS criteria provide no strict definition for the diagnosis of migraine.

Application of IHS-R criteria (Winner criteria) and the Maytal criteria were associated with the highest rates of diagnoses of pediatric migraine in some other studies, as well (7,29), suggestive of the high sensitivity of these two sets of criteria in diagnosing the disorder. In our study, only 10.5% of the patients remained undetected by the IHS-R or Maytal criteria.

Various factors may contribute to the mismatch between the clinical criteria for the diagnosis of pediatric migraine and the five mentioned sets of criteria proposed. They are as follows:

1. Osmophobia is not included in the five sets of criteria for diagnosis of migraine (44,45).
2. Although nasal symptoms frequently accompany migraine, these symptoms are not part of the IHS diagnostic criteria (46).
3. Clinically, pediatric migraine occasionally manifests with atypical symptoms such as abdominal cramps or episodes of dizziness, which remain unaccounted for in the five sets of criteria (47).
4. The children or their parents are occasionally unable to relate and explain the individual components that comprise each of the five sets of criteria for the diagnosis

of pediatric migraine. In other words, the medical history obtained in infants and young children, is limited (7,48).

5. The typical characteristics of migraine tend to emerge later and this might have led to under-diagnosis of the younger age group (49).

### Conclusion

It can be concluded that current criteria for the diagnosis of pediatric migraine have evolved along with the increase in our knowledge. The higher the accuracy and the more the comprehensiveness of these criteria, the higher is the sensitivity which results in the confirmation of diagnosis of migraine for a larger number of children. Hence, figures related to the prevalence and incidence of pediatric migraine are also likely to change.

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