

- in 1990 and projected to 2020. Cambridge, Massachusetts: Harvard University Press on behalf of the World Bank and WHO; 1996.
3. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, *et al.* Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the Interheart study): Case-control study. *Lancet* 2004; 364: 37-52.
 4. Parwal AB, Mukherjee S. Gutka and tobacco consumption and awareness of their health hazards among school and college students in Gujarat. *Indian J Comm Med* 2004; 29: 138-139.
 5. Sullivan KM, May S, Maberly G. Urinary iodine assessment: a manual on survey and laboratory methods, 2nd ed. UNICEF, PAMM, 2000.
 6. Chaudhary K. Is panmasala containing tobacco carcinogenic? *National Med J India* 1999; 12: 21-27.
 7. Kotwal A, Thakur R, Seth T. Correlates of tobacco-use pattern amongst adolescents in two schools of New Delhi, India. *Indian J Med Sci* 2005; 59: 243-252.
 8. Mukharjee K, Hadaye RS. Gutka consumption and its determinants among secondary school male students. *Indian J Pediatr* 2006; 31: 177.

Self Abortion of Attacks in Patients with Hot Water Epilepsy

M.R. Savitha, B. Krishnamurthy, D.A. Ashok* and Nallur B. Ramachandra**

*From the Departments of Pediatrics and *Psychiatry, Government Medical College, Mysore and **Department of Studies in Zoology, University of Mysore, Mysore, India.*

Correspondence to: Dr. M.R. Savitha, No. 79/A, 4th Main, Maruthi Temple Road, Saraswathipuram, Mysore- 570 009, India. E-mail: savvvy62002@yahoo.co.in

Manuscript received: March 24, 2006; Initial review completed: May 2, 2006;

Revision accepted: January 24, 2007.

A cross sectional hospital based study was undertaken to find out the various clinical aspects and management of Hot Water Epilepsy (HWE) in children. Of the 71 cases analysed, 67.6% had onset of seizures in the first decade of life. Seizures occurred frequently towards the end of head bath (71.8%). In 14.1% cases, seizures were precipitated with cold-water head bath also. Complex partial seizures (60.6%) and generalized atonic seizures (21.1%) were common. Spontaneous non-reflex epilepsy was seen in 47.9% cases. Self-induction and self-abortion of seizures were seen in 16.9% and 12.7% patients respectively. Family history was available in 32.4% of cases. Majority had good response to continuous prophylactic treatment with antiepileptic drugs. We conclude that high incidence of spontaneous seizures and generalized atonic seizures seem to be peculiar to our geographical area. "Self abortion of attacks" may be of immense help in controlling the attacks.

Key words : Hot water epilepsy.

Hot water epilepsy (HWE) is a type of reflex epilepsy(1) precipitated by the stimulus of bathing with hot water pouring over the head(2,3). Studies have shown clustering of cases in South India(3,4) with a prevalence of 60/100,000(5). The present study was taken-up to report the various clinical aspects of childhood onset of HWE.

Subjects and Methods

This study was conducted from March to

September 2004 in a teaching hospital in Mysore, Karnataka State. Each patient had to satisfy the clinical criteria for seizures as elucidated by the ILAE 2001(6). Additionally, all seizures had to have been precipitated by bathing with hot water pouring over the head. Hence, newly registered cases with HWE with age of onset of less than or equal to 18 years were included. Also, adult patients with age of onset of HWE of less than or equal to 18 years, who came to hospital for follow-up of HWE

were also included. Those patients without an eyewitness for seizure attack or patients with mental retardation were excluded.

Results

Seventy one cases of HWE (47 males, 24 females) were included. Mean age was 16.6 years (SD \pm 10.6). The age of onset of HWE varied from 3 months to 18 years. Mean (SD) age of onset of HWE was 7.6 (5.1) years. The type of seizures documented is shown in *Table I*. Majority (71.8%) had seizures at the end of head bath especially when large amounts of water are poured over the head. The common presentations of complex partial seizures (CPS) were - stereotyped irrelevant talking (65.1%), automatisms (11.1%) and vacant staring look (7%). The duration of each seizure attack varied from 5 minutes of drowsiness to upto 6 hours of sleep/headache. One-fourth (25.4%) cases did not have any postictal phenomenon and remained seizure-free even if they continued the bath after the initial seizure attack.

In 63.4% of cases, seizures were precipitated with every hot water head bath. The other precipitating factors are shown in *Table I*. However, in all the patients disease process had started by pouring hot water over the head. 34 cases (47.9%) had spontaneous non-reflex epilepsy (occurrence of seizures unrelated to bathing). The duration gap between onset of HWE and onset of spontaneous non-reflex epilepsy varied from 1 week to 20 years (mean - 5.5 years).

Twelve cases (16.9%) expressed unusual sense of pleasure just prior to the onset of seizures. Probably to experience this pleasure, these cases reported that they could deliberately induce the seizures themselves by either increasing the hotness of water or the amount of water poured over the head or recalling earlier auras experienced or a combination of all the three above. On the contrary, upon our suggestion, 9 cases (12.7%) reported that they could self abort the seizures by distracting themselves during an aura.

Family history of HWE was obtained in 23 cases (32.4%). In 73.9% of these cases similar type of seizures was found in the family. There was family history of febrile seizures in 5 cases and family

TABLE I—Factors Associated with Hot Water Epilepsy

Factors	Number of cases (%)
1. Age of onset (years)	
0 - 5	31 (43.7)
6 - 10	17 (23.9)
11 - 15	18 (25.4)
16 - 18	5 (7.0)
2. Type of Seizures	
CPS with or without generalization	43 (60.6)
Generalised atonic	15 (21.1)
Generalised tonic-clonic seizures	6 (8.5)
Generalised tonic seizures	7 (9.9)
3. Common auras experienced	
Fear	21 (29.6)
Giddiness	18 (25.4)
Epigastric discomfort	9 (12.7)
Hallucinations	7 (9.9)
Deja - Vu	5 (7.0)
4. Precipitation of Seizures	
Hot water over head	71 (100)
Washing face with hot water	8 (11.3)
Hot water on body	15 (21.1)
Cold water on head	10 (14.1)

history of spontaneous seizures in 6 cases. 11 cases (15.5%) themselves had febrile seizures.

Fourteen cases were on intermittent prophylaxis with oral diazepam one hour before head bath. Remaining patients were on daily treatment with antiepileptic drugs (phenobarbitone, phenytoin or carbamazepine). In addition patients were counseled to bathe in lukewarm water. 45 cases were available for follow-up. Of these, 5 children were on intermittent prophylaxis of which 3 cases had no response to treatment. The remaining cases were on daily treatment of whom 48.8% cases were seizure free and 34.2% cases had more than 50% reduction of seizures.

Discussion

In our study, generalized atonic seizure was seen in 21.1% cases. These patients had a sudden loss of erect posture with loss of consciousness for a brief

What this Study Adds

- "Self abortion" of attack is useful in the management of Hot Water Epilepsy.

period without tonic or tonic and clonic movements. Presence of preceding aura for few seconds, consistency of occurrence with hot water bath and postictal sleep/headache differentiated it from an attack of syncope. Only Kurata had described this type of seizures(7), indicating that this type of seizure is rare and is probably peculiar to our geographical area.

Twelve cases (16.9%) reported self induction of seizures. In some reports the incidence of self-induction was upto 28.6%(8). Majority of our patients could anticipate an "impending attack" when they experienced auras. To such patients we counseled to adopt the technique of "self abortion" of an impending attack by "acting against it" with the help of distracting maneuvers like intensely thinking something special. For example, listening to music, chanting name of God or remembering their dear ones. 12.7% of cases reported that they could self-abort the attack. Only patients above 15 years of age successfully adopted this. To the best of our knowledge, there are no previous clinical studies on the usefulness of self-abortion of attacks in the management of HWE. Wyler and ward explained probable pathogenesis of self- induction and self-abortion of attacks(9).

In our study, 47.9% cases had developed spontaneous non-reflex epilepsy which was higher than in other studies(2,3,10). The type of spontaneous seizures was similar to the type of HWE experienced. The exact pathogenesis and mode of inheritance of HWE is not known(11, 12).

We conclude that, the high incidence of spontaneous seizures and occurrence of generalized atonic seizures, could be variants of clinical presentations, peculiar to this region. The concept of self abortion of seizures highlighted in this study is useful in the overall management of HWE.

Contributors: MRS: Concept and design, acquisition and analysis of data, drafting and revising article. Act as guarantor of paper; BK: Concept, drafting of article

and revising critically for intellectual content and final approval; DAA: Concept and design, acquisition and analysis of data, drafting article and revising and NBR: Concept and design, drafting article, revising critically for intellectual content and final approval.

Funding: None.

Competing interests: None stated.

REFERENCES

1. Engel J. Jr. ILAE Commission Report. A proposed diagnostic scheme for people with epileptic seizures and epilepsy. Report of the ILAE task force on classification and terminology. *Epilepsia* 2001; 42: 796-803.
2. Subrahmanyam HS. Hot water epilepsy. *Neurology* 1972; 20: 241-243.
3. Satishchandra P, Shivaramakrishna A, Kalia-perumal VG, Schoenberg BS. Hot water epilepsy : A variant of reflex epilepsy in Southern India. *Epilepsia* 1988; 29: 52-56.
4. Gururaj G. Satishchandra P. Correlates of Hot water epilepsy in rural South India: A descriptive study. *Neuroepidemiology*, 1992; 11: 173-179.
5. Satishchandra P. Geographically specific epilepsy syndromes in India. *Hot water Epilepsy. Epilepsia* 2003; 44: 29-32.
6. Blume WT, Luders HO, Mizrahi E., Tassinari C, Emde W, Engel J. Jr. ILAE Commission Report. Glossary of descriptive terminology for ictal semiology. Report of the ILAE task force on classification and terminology. *Epilepsia* 2001; 42: 1212-1217.
7. Kurata S. Epilepsy precipitated by bathing: a follow up study. *Brain Dev* 1979; 11: 400-405.
8. Bebek N, Gurses C, Gokyigit A, Baykan B, Ozkara C, Dervent A. Hot water epilepsy: Clinical and electrophysiologic findings based on 21 cases. *Epilepsia* 2001; 42: 1180-1184.
9. Wieser HG - Seizure induction in Reflex seizures and Reflex epilepsy. *In: Zifkin BJ, Andermann F, Beaumanoir A, Rowan AJ, (eds). Advances in Neurology. Philadelphia: Lippincott Raven Publishers; 1998; p. 69-84.*
10. Mani KS, Mani AJ, Ramesh CK. Hot water epilepsy :

SHORT COMMUNICATIONS

- a peculiar type of reflex epilepsy: Clinical and electroencephalographic features in 108 cases. *Trans AM Neural Assoc* 1975; 99: 224-226.
11. Satishchandra P, Ullal GR, Shankar SK. Hot water epilepsy. *In: Zifkin BJ, Andermann F, Beaumanoir A, Rowan AJ (eds). Advances in Neurology.* Philadelphia : Lippincott Raven Publishers; 1998. p. 283-292.
12. Sinha A. Ullal G R, Shankar SK, Satishchandra P. Genetics of Hot water epilepsy: a preliminary analysis. *Curr Sci* 1999; 77: 1407-1410.
-