

The sodium content of drinking water in Benghazi was high—20.8 to 56 mMol/L(4) and we assumed the high incidence of hypernatremia to be related to the high sodium content of the water(2). In case WHO ORS is prepared using water with a high sodium content, the solution will, inevitably, contain undesirable levels of sodium. Therefore, regional modifications of ORS are essential.

As rightly pointed out, 90 mMol/L sodium may not be essential during maintenance therapy. One wonders if there is a case for follow-on ORS with a lower sodium content.

Harjit Singh,
P.O. Box 12836, Dubai, UAE.

REFERENCES

1. Mehta MN. ORS: Controversies and perspectives. 1994, 31: 895-900.
2. Singh H, Naguib O, Elzouki AY. Hypernatremic dehydration in infantile gastroenteritis: Possible role of drinking water. *In: Pediatric Infectious Diseases in Arab Countries*, Ed A Y Elzouki. Chichester, John Wiley & Sons, 1987, pp 61-64.
3. Jaikshian, Elzouki AY, Singh H, *et al.* Hypernatremia in the newborn infant. *Ann Trop Pediatr* 1986;6: 221.
4. Mir NA, Elzouki AY. Oral rehydration solution and electrolyte content of water. *Arch Dis Child* 1984, 59: 903.

Steroids in Bacterial Meningitis

The editorial "Recent trends in the management of acute bacterial meningitis"(1) was very informative. But it failed to address if steroids can be recommended when ampicillin and chloramphenicol are used. Studies in 1960's, failed to demonstrate consistent beneficial effects when steroids were added to ampicillin plus chloramphenicol in the treatment of meningitis(2). So this practice did not receive acceptance. Recent studies showed beneficial effects of steroid therapy when the antibiotic used was a 3rd generation cephalosporin.

The minimum inhibitory concentration (MIC) of ceftriaxone against common meningeal pathogens is very low. Thus ceftriaxone achieves a CSF concentration that is 228 times the MIC of *H. influenzae* as compared to 15 times for chloramphenicol and 40 times for ampicillin(2). Such high CSF concentrations of ceftriaxone lead to rapid bacterial killing and release of bacterial products, thus triggering an intense inflammatory response. High CSF levels of endotoxin following ceftriaxone are reported in the literature(3). In this situation steroids are effective in controlling the inflammation. Due to the lower effective CSF concentrations achieved, the problem of excessive inflammatory response must be theoretically less when we use ampicillin or chloramphenicol for treat-

ing *H. influenzae*, the commonest meningeal pathogen.

It is that the same may not be applicable to other pathogens. For example ampicillin achieves a CSF concentration 198 times the MIC of pneumococcus. As expected theoretically, studies have shown beneficial effects when steroids were added to ampicillin plus chloramphenicol for treating pneumococcal meningitis(2).

One of the side effects of steroids is the delayed sterilization of CSF. Hence an antibiotic like ceftriaxone which rapidly sterilizes CSF(2) is required when steroids are used. In addition is the possible problem of plasmid mediated resistance of *H. influenzae* to both ampicillin and chloramphenicol(2) in which case steroids can be hazardous.

Thus it seems reasonable to restrict

the use of steroids to cases of *H. influenzae* meningitis only when ceftriaxone is prescribed.

A. Santhoshkumar,

*Department of Pediatrics,
Medical College (SAT) Hospital,
Thiruvananthapuram 695 Oil.*

REFERENCES

1. Singhi PD. Recent trends in the management of acute bacterial meningitis. *Indian Pediatr* 1994, 31:1321-1326.
2. Levin M, Heyderman RS. Bacterial meningitis. *In: Recent Advances Pediatr* No. 9. Ed. David TJ. London, Churchill Livingstone, 1991, pp 1-19.
3. Arditi M, Abies L, Yoger R. Cerebrospinal fluid endotoxin levels in children with *H. influenzae* meningitis before and after administration of intravenous ceftriaxone. *J Infect Dis* 1989,160:1005-1011.

Reply

Dexamethasone is recommended as adjunctive therapy in meningitis as it minimizes the host inflammatory response and its adverse neurological consequences. This inflammatory response is elicited by the presence of bacteria and their components in the subarachnoid space, and occurs even before the administration of antibiotics which may augment the response as they cause bacterial lysis. Dexamethasone is used to attenuate this inflammatory process as

well as prevent its augmentation after antibiotic administration.

The two early clinical trials in which ampicillin and chloramphenicol were used and which did not demonstrate any significant benefit of steroids have been criticized(1), as in one(2) methylprednisolone (which may not be as effective as dexamethasone in this setting) was used, and in the other(3) the dose of dexamethasone used was significantly lower than that used in more recent studies.

Since in developed countries the choice of initial antibiotics for meningi-