

Poisoning From a Dietary Supplement Administered During Hospitalization

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ABSTRACT. Increasing numbers of persons use dietary supplements (DS). Patients who believe in the effectiveness of DS may continue to take them on admission to a health care facility. We present the case of a child who received a DS on a daily basis as an outpatient, continued its use after admission to the hospital, and became poisoned by it during his hospitalization. *Pediatrics* 2002;109(3). URL: <http://www.pediatrics.org/cgi/content/full/109/3/e49>; dietary supplements, poisoning, bromism, barbiturates, hospital policy.

ABBREVIATION. DS, dietary supplement(s).

The American public increasingly uses complementary and alternative medicines, of which herbs and dietary supplements (DS) are the most commonly used.¹⁻⁵ Up to 66% of chronically ill patients use these therapies.^{2,6-10} Because individuals with chronic medical problems are more likely to try DS and to require hospitalization, DS use is prevalent in hospitals.^{6,11-13} However, hospitals infrequently stock DS as formulary items and are unable to dispense them, compelling patients to bring their own home supply of DS into health care facilities.¹¹ We report a case of a child who, while an inpatient, became poisoned by a DS that he continued to use after admission into a hospital.

CASE REPORT

A 10-year-old Bosnian boy with a previous medical history of mental retardation, cerebral palsy, seizure disorder, and blindness was admitted for aspiration pneumonia. His mother reported that he had received, in addition to carbamazepine, valproic acid, and carnitine, an Asian patent remedy, "Diankexing," which was obtained from an herbalist (Fig 1). The child had experienced up to 100 seizures per day, which were only moderately controlled with conventional anticonvulsants. The patient's mother discussed the patent remedy with other parents who had administered it to their children without problem. In addition, she obtained an analysis from an analytical chemist who stated the patent remedy was safe. Six months before presentation and with

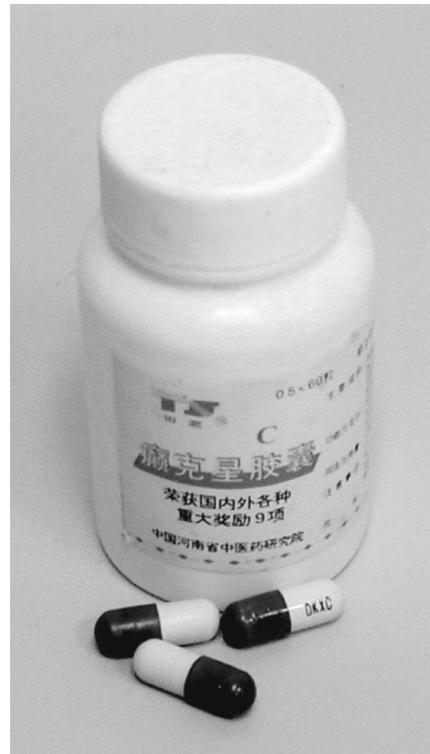


Fig 1. Diankexing.

the knowledge of the child's primary care physician and neurologist, the patient's mother began administering the remedy; her son exhibited dramatically decreased seizure activity without behavioral side effects or obvious mental status change. Two months before presentation, the patient's mother increased the dose from 1.5 to 2 capsules per day. Seizure activity ceased; she subsequently weaned and stopped carbamazepine, still with no seizure activity. She did notice, however, increasing lethargy in her son. Four days before presentation, the child developed an upper respiratory tract infection; by the day of admission, he became febrile and stopped eating. He was brought to the emergency department where his respiratory rate was 38 breaths per minute; other vital signs were normal on intake. With physician approval, his mother administered 1 dose of the patent remedy in the emergency department. En route to the ward, he developed respiratory depression and aspirated. He was transferred to the intensive care unit for additional care.

A complete blood count, serum glucose, electrolytes, and renal function tests were normal. His anion gap was 12 mEq/dL. Serum valproate and carbamazepine concentrations were 51 mg/dL and 0.9 mg/dL, respectively. A urine toxic screen was positive for barbiturates; the phenobarbital concentration was 95 μ g/mL (therapeutic range: 20-40 μ g/mL). A serum bromide concentration was 41 mg/dL (normal: 2-4 mg/dL). The patent medicine was withheld and multiple doses of activated charcoal were instilled via nasogastric tube. Normal saline and furosemide

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were administered to promote bromide excretion. The child's mental status changed from coma to agitation over the ensuing 24 hours. A serum bromide concentration obtained 2 days later was 31 mg/dL. After readjustments in his regular anticonvulsant medications, he was discharged after a 14-day hospitalization. At that time his mother requested that he be restarted on the remedy, but his neurologist and pediatrician did not support that management because of concerns about quality control in the patent remedy.

A laboratory analysis of the patent remedy identified the presence of barbiturates (phenobarbital and mephobarbital) and calcium, magnesium, sodium, and potassium bromide salts. Three months after hospitalization, the child was maintained on phenobarbital and carbamazepine but was suffering approximately 30 seizures per day. He was restarted on bromide therapy for seizure suppression.

DISCUSSION

This patient's course highlights not only the risk of toxicity from DS but also the inadequacies of the medical community to address this problem. The clinical course, characterized by slowly diminishing cognitive function, is characteristic of bromism. Bromide has a half-life of elimination of 12 days; repetitive daily dosing of the medication leads to accumulation of bromide and, after time, toxicity.¹⁴ In this case, a serum bromide concentration was obtained because, to our knowledge, no other sedative hypnotic agents produces a progressive decrease in mental status over an extended duration; there is no tachyphylaxis to bromide. The decline of this patient into coma presumably arose from the interaction of bromide with the barbiturates found in the DS. Once the DS had been discontinued and the effect of the barbiturates had lessened, the patient became agitated, a clinical effect observed in persons with depressed cognitive function at bromide concentrations comparable with our patient.¹⁵ When bromide and phenobarbital concentrations had normalized, the child's agitation abated but seizure activity resumed.

The use of DS is fraught with uncertainty because of users' underlying illnesses and the products themselves.¹⁶ Prepared without established manufacturing practices and often lacking safety and efficacy data, DS represent significant health risks to patients through direct toxicity, the presence of adulterants or contaminants, or drug-herb interactions.^{11,16,17} This child used a subclass of DS known as an Asian patent medicine.¹⁸ These remedies often are formulated in pill and tablet form to mimic pharmaceuticals but may contain adulterants. Heavy metals such as lead, arsenic, and mercury salts; pharmaceuticals including acetaminophen, phenytoin, and benzodiazepines; and chemicals banned for sale in the United States (such as phenylbutazone and phenformin) have been found in Asian patent medicines.^{18–21}

This case also demonstrates the ineffectiveness of efforts to protect patients from poisoning by DS. DS users who seek information on DS frequently rely on informal or nonmedical sources; most are reticent to discuss their use of these products with their physicians.^{1,6,11,22–24} This patient's mother, however, surpassed common efforts in seeking information on the efficacy and safety of the DS she wanted to use. Not only did she discuss the DS with other users, her

pediatrician, and neurologist, she obtained a chemical analysis that suggested that the DS was "safe." Despite her efforts, she failed to prevent poisoning her child. Thus, prudence, diligence, and good intentions seem to be insufficient protection against toxicity from DS.

Finally, this case reflects the confusion felt by health care facilities regarding the management of DS among inpatients.¹¹ The Federal government in 1994 passed the Dietary Supplement Health and Education Act, which considers all herbal products as foods irrespective of historical uses.^{18,25} This legislation defines DS as containing at least 1 of the following: vitamin, mineral, herb or botanical, amino acid, dietary substance to supplement the diet by increasing the total dietary intake; or concentrate, metabolite, constituent, extract, or combination of any ingredient listed above.^{18,25} Although considered foods by the Food and Drug Administration, DS nonetheless meet the broad definition of drug given by regulatory bodies such as the Joint Commission for the Accreditation of Health care Organization.^{11,16,26} Hospitals are therefore expected to manage DS with the same diligence and care given to other medications, an expectation that requires the development of pharmacy policies.^{11,27} Unfortunately, the lack of consistent manufacturing practices, safety and efficacy data, and poor understanding of DS by many physicians has made the crafting of coherent hospital policies—that promote patient satisfaction by permitting some degree of inpatient DS use while protecting patient safety—difficult.¹¹ Although Joint Commission for the Accreditation of Health Care Organization clearly impels policy development, it offers no specific suggestions on the matter or resources to assist in the drafting of policies.¹¹

The use of DS represents an avoidable risk to patient safety; when used on an inpatient basis, the risks associated with these products subjects both physicians and health care facilities to liability.¹¹ On a Federal level, these risks can be mitigated by legislation that ensures DS are pure and free of adulterants. At the local level, health care facilities should develop policies that manage DS in a manner similar to other pharmaceuticals and over-the-counter products. On an individual level, clinicians should access resources that facilitate clinical decision-making such as toxicology consultants, online databases, or poison control centers. These recommendations, although not exhaustive, could improve patient safety and blunt the risk of poisoning from DS.

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