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CASE REPORT

Always Read The Fine Print - Cyanide Toxicity From Ingestion Of Vitamin B17 Tablets: A Case Report

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ABSTRACT

The use of vitamins and minerals as supplements is highly prevalent in most patient populations, owing to their purported long-term benefits and relative lack of harm on continued use. However, similarly marketed supplements may contain ingredients that can harm the user. Our case highlights a 45-year-old male who ingested several tablets of a supplement known as vitamin B17, Amygdalin, with subsequent fatigue, mild lactic acidosis, and worsening shortness of breath. He was treated as a case of cyanide toxicity based on clinical suspicion and improved subsequently. The case describes the potential harm from unregulated substances, particularly those purchased online. Vitamin B17, or Amygdalin, may be present in various anti-cancer supplementation and caution is advised in its use due to its association with cyanide poisoning.

KEYWORDS

Amygdalin, Cyanide Toxicity, Vitamin B17, Case Report

INTRODUCTION

The general population has long consumed vitamin and mineral supplementation. Although marketed to propagate benefits in health and wellbeing, most supplements have been shown to provide little to no health benefit to the consumer [(1)]. However, their use continues to rise and is a staple in many households worldwide. This is bolstered by the fact that no significant adverse effects are usually linked to consuming vitamins or minerals.

In some cases, however, the seemingly benign substances may pose a risk of harm to the user. Despite ongoing monitoring and removal of supplements that contain harmful substances from stores, circulation through internet sales may continue. The following case report highlights the development of cyanide toxicity in a 45-year-old male patient who accidentally ingested a large amount of vitamin B17 tablets he purchased online.

CASE REPORT

A 45-year-old male presented to the Emergency Department (ED) at a community hospital with complaints of fatigue, shortness of breath and anxiety following a possible over-ingestion of vitamin supplement tablets. Upon arrival at the ED, the patient was visibly anxious and mildly diaphoretic. The tablets were bought online to promote long life and prevent cancer development. Having misread the instructions, the patient accidentally took eight pills altogether for the first time earlier that morning instead of the recommended one tablet per day. He did not bring the medication bottle with him.

Examination revealed a tired-looking patient with vital signs significant only for mild tachycardia of 105 beats per minute (bpm) and oxygen saturation (SpO2) 95% on room air. An initial Arterial Blood Gas (ABG) was notable for elevated lactate of 1.8 mmol/L. With continued observation in the ED, he was started on an initial intravenous fluid bolus of 500 mL of 0.9% normal saline. The patient was monitored frequently until his investigations returned, during which time he remained clinically stable but with a persistent feeling of fatigue.

Complete Blood Count (CBC), Urea, Electrolyte panel and a Chest radiograph revealed no significant abnormalities. A second ABG after 500 mL of IV fluids demonstrated a rise in his lactate levels to 2.6 mmol/L, despite hydration.

The patient's spouse arrived with the bottle of supplements filled to about ¾ of its capacity. The label indicated that each capsule contained 250mg of 'Vitamin B17.' The persistence of fatigue and rising lactate despite fluid administration prompted an internet search into whether any adverse effects were linked to the over-ingestion of vitamin B17 and revealed reports of cyanide toxicity from vitamin B17 or Amygdalin.

One hour after his arrival in the ED, with worsening fatigue and somnolence as well as ingestion of a substance linked to cyanide toxicity, treatment was initiated with five grams of intravenous hydroxocobalamin, followed by admission to the Intensive Care Unit (ICU) for close observation.

Over the next 24 hours, the patient showed remarkable improvement, feeling more alert, with declining fatigue and shortness of breath. By 12 hours, his lactate had returned to normal, and no other metabolic derangement was noted in laboratory investigations. No significant interventions were necessary apart from the initial dose of hydroxocobalamin and maintenance IV fluids. The day after his admission, the patient transitioned to the medical ward and was eventually discharged with no further sequelae or subjective complaints.

DISCUSSION

Vitamin and mineral supplements are considered widespread in the general population. These products are often marketed as promoters of nutritional health and wellbeing and the prevention of cardiovascular disease and cancer development. Multivitamins are even endorsed and prescribed by various healthcare providers for their patients.[1]

Outside of replacement of known deficiency, consumption of multivitamins does little to improve patients' health objectively, and evidence of their role in preventing cardiovascular disease and cancer is limited. Despite this, the frequency with which these products are purchased and consumed continues to rise and is likely to remain prevalent since the use of these supplements is not known to cause harm. Unfortunately, this relative safety does not extend to some newer products marketed alongside other vitamins, which have been found to contain substances that may indeed cause harm to the user. [2] One such culprit is Vitamin B17.

Vitamin B17(Amygdalin) is a naturally occurring chemical compound found in the seeds of fruits such as apricots, bitter almonds, apples, peaches, and plums. At the molecular level, amygdalin is formed as a chemical combination of Glucose, Benzaldehyde and Cyanide. The cyanide component is released by the action of Beta-Glucosidase and Emulsin enzymes, both of which are not present in human tissues. However, microorganisms present in human intestinal linings have been found to possess similar enzymes that effectively promote cyanide release from the Amygdalin compound. Therefore, the resulting cyanide toxicity is almost 40 times more toxic by the oral route compared with IV injection of the mixture. [3]

A modified form of amygdalin has been available under the brand name Laetrile ® since the early 1950s as an alternative treatment to fight cancer. However, most studies have failed to show any such benefit in humans. Several reports have showcased the potentially fatal adverse effects caused by the medication's cyanogenic ability. [4] Despite these reported adverse effects and regulation on the original Laetrile® supplement, numerous advocates promote the potential benefits of taking Amygdalin. Unregulated forms of Amygdalin continue circulating on the market. They are usually available without the need for a prescription.

The toxicity of amygdalin depends on intestinal conversion, with peak levels of cyanide usually reached at around two hours post-ingestion. Five hundred mg of oral amygdalin may contain up to 30 mg of cyanide. [5] A minimum lethal dose of cyanide is approximately 50 mg or 0.5 mg/kg body weight. [6] Our patient had ingested eight 250 mg tablets, which amounts to 2000 mg of amygdalin, exposing him to a dose of cyanide well above the lethal dose.

A curious phenomenon was evidenced in studies which found that the conversion of amygdalin to cyanide in vitro was further accelerated when amygdalin was ingested with foods containing beta-glucuronidase (such as bean sprouts, peaches, celery, and carrots) or with a concurrent intake of high doses of vitamin C.[7,8]

Cyanide binds to the ferric ion on cytochrome oxidase in mitochondria and blocks the electron transport chain, thus halting oxidative metabolism, resulting in cell death, hypoxia, and lactic acidosis. Mild to moderate cases manifest as tachycardia, headache, confusion, nausea, and weakness. Severe cases may present with cyanosis, coma, convulsions, cardiac arrhythmias, cardiac arrest, and death.

A few investigative modalities may help guide the diagnosis of cyanide toxicity. Blood gas measurements commonly reveal high venous oxygen and elevated serum lactate levels, though these findings are not specific to cyanide poisoning. Our patient demonstrated a rise in lactate levels despite fluid resuscitation, pointing to ongoing cellular anaerobic metabolism.

Quantitative tests can also specifically measure cyanide in any body fluid, such as blood and urine. However, they are seldom used in the ED as results take several hours to days to return and cannot be used to guide treatment.

Management usually incorporates either direct chelation with hydroxocobalamin or dicobalt edetate or competitive removal using amyl nitrite or sodium nitrite to induce methemoglobinemia followed by conversion to thiocyanate by sodium thiosulfate for excretion.[9]

Several cases of cyanide toxicity have been described in literature secondary to Amygdalin use, with some specific instances of vitamin B17 use. A systematic review in 2007 evaluated 368 patients and found that approximately 15% of patients experienced adverse events, with a high risk of developing cyanide poisoning and some fatalities among the cases reviewed.[10]

Several cases have described the cyanogenic potential of vitamin B17 ingestion, with consumption frequently encountered in patients with cancer. The highest serum cyanide level, 515µg/l, was observed in a 4-year-old child who had used the substance as part of alternative medicine treatment.[7,11-13]

Amygdalin's use in its natural form is also widespread, as evidenced by the prevalence of apricot seed ingestion, with an increased tendency of ill effects in children. One study in the Turkish Pediatric Intensive Care Unit (PICU) observed 13 cases of cyanide toxicity from apricot seed ingestion over four years. Though the quantity of cyanide contained within each apricot seed has not been well described, intoxication tends to manifest when numbers between 5-25 are ingested.[14]

To our knowledge, no cases of cyanide toxicity from vitamin B17 or Amygdalin use have been documented in the United Arab Emirates. Information from the toxicology consultation service at the Rashid Hospital in the central city of Dubai also revealed no reported cases of cyanide toxicity secondary to ingested substances over the past ten years.

CONCLUSION

Our case highlights the only known report of cyanide toxicity from vitamin B17 or Amygdalin ingestion in the United Arab Emirates. However, given the ease of access to Amygdalin supplements that continue to be sold online, a significant risk of adverse events still exists for many consumers worldwide. Increasing awareness of the cyanogenic potential of these substances will undoubtedly allow for stricter control of their distribution and minimize the risk of harm from misuse.

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