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RESEARCH ARTICLE
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AN OBSERVATIONAL STUDY TO ASSESS THE NEUROLOGICAL MANIFESTATIONS OF STINK BUG INTOXICATION AT A TERTIARY CARE INSTITUTE IN NORTHEASTERN INDIA: ORIGINAL ARTICLE

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BACKGROUND

Insects are consumed as food in many parts of the world and over 1000 species of insects are reported to be consumable [1]. Stink bug is consumed in some northeastern states of India [2]. Some ethnics of Arunachal Pradesh (northeastern state of India) also consume stink bugs and consider them a delicacy. Common species found in Arunachal Pradesh are the *Coridius nepalensis* and *C. singhalanus* [3]. The less abundant is the *C. chinensis* [3]. They are found abundantly during winters starting from late October to November in the dry stony riverbed and are commercially available in the local markets.**(Figure 1)**

Figure 1

Figure 2

The locals collect and relish on them, locally known as Tari or Gandi Puk (**figure 2**) with various recipes[4]. However few of them develop toxicities after consuming them and develop symptoms from mild to severe requiring hospitalisation. It has been observed that most of them present with predominant neurological manifestation. There are only very few Literatures available addressing the toxicity and symptomatology except for some allergic reactions [5]. Here we seek to address the neurological manifestations of toxicity of stink bug consumption.

AIMS AND OBJECTIVES:

To assess the various neurological manifestations of stink bug intoxication presenting at tertiary care centre.

METHODS AND MATERIALS:

This observational study was conducted at Tomo Riba Institute of Health and Medical Sciences, a tertiary care centre at Arunachal Pradesh. Cases were collected from October 2018 till March 2024 with following inclusion and exclusion criterias:

1. **Inclusion criteria:**
   a. Patients of any age presenting to the hospital with symptoms after consuming stink bug within past 1 week.
2. **Exclusion criteria:**
   a. Patient with concomitant chronic ailments and other comorbidities that could hamper the study
   b. Chronic alcoholic patients and patients who consumed alcohol in the past 48 hours of presentation.

Detailed history and clinical examination findings were noted. Routine investigations including Complete blood count, Liver function tests, Renal function tests, serum electrolytes, Random blood sugar and ECG were done. In select cases Ultrasonography of abdomen and NCCT brain was obtained. All of them were managed conservatively and the observations were expressed in percentages. After meeting all the inclusion and exclusion criteria a total of 92 cases were included in the study.

OBSERVATIONS:

1. Age and sex:

Out of 92 patients 54 (58.9%) were male and 38 (41.3%) were female with male: female ratio of 1.4:1. The mean age of the cases were 33.5 years.

2. Time of symptom onset: (table 1)

It was observed that 76 patients (82.6%) presented within 6 hours, 9 patients (9.7%) within 6-12 hours and 7 patients (7.6%) after 12 hours of consuming stink bugs.

Table 1: time of symptom onset

Time of symptom onset	Number of patients (%)
<6 hours	76 (82.6%)
6-12 hours	9 (9.7%)
>12 hours	7 (7.6%)
Total	92

3. Spectrum of symptoms: (table 2)

a) Vertigo was the commonest presenting complaint, experienced by 83 (90.2%) patients. It was of moderate to severe intensity, exaggerated by opening eyes and movements. They prefer to lie still

with closed eyes. Vertigo usually lasts for 3-7 days and in 3 patients it continued for more than 3 weeks.

b) Tremor was second most common complaint, experienced by 77 patients (83.6%). Tremor was coarse in intensity, involving both limbs symmetrically occurring in are both at rest and on movement. Tremors cause impaired motor coordination due to which they have difficulty in moving around and doing simple tasks. Compared to vertigo the tremors subside earlier.

c) Imbalance was reported in 75% of the patients. It usually subsides by 2-3 days, probably occurs due to vertigo and tremors leading to impaired motor coordination of limbs and gait and leading to imbalance.

Table 2: Spectrum of symptoms

Symptoms	**Total patients (%)**
Vertigo	83 (90.2%)
Tremors	77 (83.6%)
Imbalance	69 (75%)
Vomiting	58 (63.04%)
Brain fog	24 (26.08%)
Diarrhoea	10 (10.8%)
Altered sensorium	3 (3.26%)
Urinary retention	1 (1.08%)

d) Vomiting was reported by 58 patients (63.04%) which was more severe at the onset and then gradually subsided. It was non projectile.

e) Brain fog, described by patients as difficulty to think clearly, focus, or remember things and lack of clarity/mental fuzziness was reported by 24 cases (26.08%). Usually, they report it after they recover.

f) 10 patients (10.8 %) had diarrhoea lasting 2-3 days which was watery without mucus or blood. It was not associated with abdominal pain.

g) 3 patients (3.26%) were admitted with altered sensorium. They were unresponsive to verbal commands but localised pain stimuli. There was no neck rigidity or signs of raised intracranial tension. Brain scanning were normal. This state lasted for more than a week and vertigo/tremors persisted unusually longer even after they regained full mental status. They had prolonged hospital stay of 2-3 weeks.

h) 1 patient experienced urinary retention on the 2nd day of admission for which he had to be catheterized. His associated symptoms were vertigo and tremors.

4. Physical examination findings (table 3)

On physical examination, the commonest finding was hand tremor, observed in almost all the patients which ranged from mild to severe. Tremors was bilateral and symmetrical present at rest, action, and any position of limbs.

Table 3: clinical findings:

Clinical findings	**Total patients**
Tremors	92 (100%)
Impaired motor coordination	82 (89.13%)
Ataxia	80 (86.9%)
Tachycardia	61 (66.3%)

Nystagmus	60 (65.2%)
Facial spasms	29 (46.7%)
Impaired cognition	3 (3.2%)

Some had severe tremors causing impairment of motor coordination with difficulty in performing simple tasks (due to intension and action tremors and ataxia of limb and gait). In 66% of the patient's tachycardia was noted with other vital signs being normal. 46% of the patients had bilateral, asymmetric, and asynchronous facial contractions suggestive of facial spasms. Horizontal nystagmus of both eyes was noted in 60 patients (65.2%) and was more pronounced in those who had severe vertigo. 3 patients had Impaired cognition who had severe symptoms even after they regained full consciousness.

5. Laboratory Profile

The laboratory findings were not so significant except for mild Leucocytosis in 16 patients (17.39%), mild Thrombocytopenia in 11 patients (10.95%) and dyselectrolytemia mainly mild hyponatremia and hypokalaemia in 23 patients (25%). These findings were transient and normalised within 2-3 days. The management was largely symptomatic, all of them recovering fully within few days except for 3 patients who had impaired cognition who continued to have mild tremor and vertigo even after 3 weeks of hospital stay.

DISCUSSION

Over 1000 Insects species are consumable [1]. In Central and South America, Oceania, Asia, and Africa various ethnic groups consume them[6]. Stink bug is a nutrient and antioxidant-rich food containing high amounts of proteins, fats, and phosphorus[7]. Among northeastern states of India [2], Arunachal Pradesh is one where its consumption is common. Locally known as Tari or Gandi Puk they are found in the stony riverbeds during winter and are consumed raw or cooked. Species of stink bug found in Arunachal Pradesh are *Coridius nepalensis*, *C. singhalanus*. and *C. chinensis*[3]. Unfortunately, few individual develop toxicity after consuming them and present with arrays of symptoms mainly of CNS and GIT. Literature review shows very scant information on the symptomatology of its toxicity except for some case reports of contact dermatitis and contact keratitis [8], which was not seen in our patients .Severe vertigo, vomiting, and acute kidney injury is reported from Sikkim [9], similar to our study except for acute kidney injury . In our study we endeavoured to shed light on the symptomatology due to stink bug intoxication. We studied 92 patients who met the inclusion criteria. We observed that symptoms appear mostly within 6 -12 hours of consumption. Males were affected more. Their presentation and clinical findings are of the Central Nervous System (CNS) with cerebellar signs (horizontal nystagmus, intention tremors, truncal ataxia, dysdiadochokinesia and ataxic gait), hyperkinetic movement disorders (tremors and facial spasms), and cognitive impairment (brain fog, altered sensorium). Most common clinical presentation were severe vertigo, vomiting, nystagmus, and ataxia of limbs and trunk suggesting involvement of the cerebella-vestibular system. Some had gastrointestinal symptoms common to food poisoning. Literature review mostly illustrates histamine related symptoms after consuming insects[10,11] like urticaria, rashes, anaphylaxis, and gastrointestinal manifestations. Our study illustrates mostly neurological signs/symptoms suggesting probable neurotoxicity of the stink bug. Brain imaging did not show any structural involvement but just transient functional impairment as patients recovered fully. The clinical findings are consistent with previous case reports from the institute[12]. Stink bugs produces blends of odoriferous compounds to deter predation and warn relatives of impending danger, which are believed to be the bioactive compounds responsible for its toxicity [3]. Local people believe toxicity is due to the consumption of already dead stink bugs [3]. Way of collecting and consuming, compromising hygiene may also contribute to food poisoning. Many People find it difficult to resist the peculiar taste even though they are aware of its toxicity. And interestingly many are admitted repeatedly for the same.

CONCLUSION:

Though considered a nutritious source of food, we cannot deny the fact that it causes toxicity in certain people and cause array of symptoms predominantly neurological symptoms as described in our study. It is evident that certain species of stink bug are neurotoxic affecting mainly cerebella-vestibular systems. So further research is necessary to ascertain the neurotoxin and to establish the safety of the species of stink bug available in this region for human consumption. At the same time public awareness is important.

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