

BIOLOGICAL TOXICOLOGY RESEARCH DIVISION

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Under the National Poison Control Centre (NPCC), Biological Toxicology Research Division is mainly involved in the research areas of Environmental Health and conducting research on toxins produced by the living organisms. During 2016, research projects related to food safety were undertaken.

RESEARCH PROJECTS

1. ENVIRONMENTAL HEALTH

1.1 POISON EPIDEMIOLOGY

1.1.1 Monitoring of poisoning cases at some major referral hospitals and multi-level hospitals in Myanmar (Identification of poisoning cases admitted to different level hospitals in Mandalay and Ayeyarwady Regions, Myanmar)

A retrospective, record-review study was done at 8 different level hospitals in Mandalay and Ayeyarwady Regions. Clinical record charts of all patients admitted to the study hospitals for poisoning during September 2015 to August 2016 were reviewed and required information was extracted. Percentages of poisoning patients to total admission ranged from 2.13% to 0.97% in study hospitals and were not different between 2 Regions. Although the population of Mandalay and Ayeyarwady regions were almost the same (6165723 vs. 6184829) according to 2014 Census data, the number of poisoning patients admitted to hospitals in Mandalay Region was about fourfold higher than that of Ayeyarwady Region (545 vs. 154). Insecticide poisoning was the highest in both Regions (35.41%; 193/545 in Mandalay Region and 39.61%; 61/154 in Ayeyarwady Region). In Mandalay Region, it was followed by drug poisoning (30.46%; 166/545), unknown poisoning (9.91%; 54/545), food poisoning (9.36%; 51/545) and chemical poisoning (7.52%; 41/545) and in Ayeyarwady Region, chemical poisoning (27.27%; 42/154) was second common and food poisoning (11.69%; 18/154), unknown poisoning (7.14%; 11/154) and drug poisoning

(6.49%; 10/154) followed. Insecticide poisoning was also the commonest type of poisoning in all level hospitals. Regarding snake bite, it was much higher in Mandalay Region than Ayeyarwady (1203 vs. 122). Viper bite was the highest (67.58%; 813/1203) followed by unknown snake bite (22.69%; 273/1203), green snake bite (7.56%; 91/1203) and cobra bite (2.16%; 26/1203) in Mandalay Region. Unknown snake bite was the highest (43.44%; 54/122) followed by cobra bite (29.51%; 36/122), viper bite (20.49%; 25/122) and green snake bite (6.56%; 8/122) in Ayeyarwady. Mortality was the highest among patients with insecticide poisoning (10.63%; 27/254) and the highest cause of morbidity was found out to be viper bite as 12.89% (108/838) of the patients needed to be transferred or referred for the treatment of complications. As it was a retrospective study, the factors contributing higher burden of poisoning in Mandalay Region were not able to be explored. Educational programme for safe handling and storage of agriculture related poisonous products, snake protective measures and psychological support program for the people of Mandalay Region should be considered.

Table 1. Type of poisoning cases admitted to study hospitals in Ayeyarwady Region

	Pathein	Myaungmya	Kyaiklat	Yonedaunt	Total
Unknown bite	1	19	141	8	169
Unknown snake bite	0	21	17	15	53
Green Snake bite	0	7	1	0	8
Viper bite	15	3	7	0	25
Cobra bite	24	11	0	1	36
Insect/animal bite	0	8	0	1	9
Rodenticide	1	6	0	0	7
Insecticide	36	19	6	0	61
Herbicide	2	0	0	0	2
Other Chemicals	36	6	0	0	42
Food	6	6	6	0	18
Drug	2	6	2	0	10
Unknown poisoning	1	4	3	3	11
Mushroom	3	0	0	0	3

Table 2. Type of poisoning cases admitted to study hospitals in Mandalay Region

	Mandalay	Meikhtila	Nahtogyi	Wetlu	Total
Unknown bite	13	90	38	15	156
Unknown snake bite	214	46	11	2	273
Green Snake bite	31	49	9	2	91
Viper bite	637	126	37	13	813
Cobra bite	17	3	2	4	26
Insect/animal bite	2	7	1	0	10
Rodenticide	17	9	4	1	31
Insecticide	118	62	10	3	193
Herbicide	2	0	0	0	2
Other Chemicals	33	3	4	1	41
Food	31	9	7	4	51
Drug	142	23	0	1	166
Unknown poisoning	48	3	2	1	54
Mushroom	4	3	0	0	7

1.2 FOOD SAFETY

1.2.1 Assessing potential contamination of aflatoxin B₁ in roasted ground coffee (Detection of Aflatoxin B₁ in coffee)

Coffee is the popular beverage all over the world. AflatoxinB₁, a mutagenic and carcinogenic mycotoxin can be contaminated in coffee and other seeds. This study aimed to determine the aflatoxin B₁ in roasted ground coffee by indirect competitive ELISA method (MaxSignal, BIO SCIENTIFIC, USA). A total of 40 samples (8 samples each in five items of roasted ground coffee) were collected from commercial outlets and retail shops. The samples processing and ELISA procedure were done on 40 samples and duplicates according to Manufacturer's instruction. The range for aflatoxin contamination level was 1.2 $\mu\text{g kg}^{-1}$ and 3.5 $\mu\text{g kg}^{-1}$. The maximum permissible level of aflatoxin B₁ for seeds is 5 $\mu\text{g kg}^{-1}$. The result showed that optical density of all tested samples were below the permissible level.

1.2.2 Determination of Sudan dyes in spices by using LC-MS-MS (Detection of azo-dyes (Sudan) in chilli/curry powder)

Sudan dyes, normally used for coloring plastics and other synthetic materials, are illegal dyes in food stuff. A cross-sectional study was conducted to detect the Sudan I dye in non-labeled chilli powder samples sold in various markets of Yangon Region. The presence of Sudan I was tested by LCMS/MS after the method was validated. Out of 20, 4 samples (20%; 4/20) were found to be contaminated with Sudan I. Among 4 positive samples, 2 samples contained low level of Sudan I less than 50 ppb (46.2 and 42.7 ppb, respectively). Since these concentrations were so low, it is unlikely that they were intentionally adulterated. Another 2 samples contained Sudan I more than 500 ppb, proposed action limit of the European Union for Sudan I (59.9 and 60.4 ppm, respectively). European Standing Committee on the Food Chain and Animal Health hypothesized that low levels (10-500 ppb) of illegal dyes might be contamination from other sources. The manufacturers should continue to investigate sources of contamination when detecting levels below 500 ppb and take measures to reduce the levels whenever possible.

1.2.3 Detection of Aflatoxin B₁ in pepper, curry and wheat powders by High Performance Liquid Chromatography (HPLC)

This study aimed to determine the aflatoxin B₁ in black pepper, curry powder and wheat flour and it was conducted from July 2015 to June 2016. *Aspergillus flavus* is a common mold found in tropical and subtropical countries and has been found to cause aflatoxin contamination. Aflatoxin B₁ is one of the well-known most potent and abundant environmental mutagens and carcinogens. In this study, a total of 15 samples of black pepper powder, wheat flour and curry powder (each of 5 samples) were randomly obtained from markets and spices shops in Yangon downtown area. The aflatoxin contamination in those samples was detected by High Performance Liquid Chromatography (HPLC) method. The aflatoxin B₁ contamination was detected in 5 (33.3%) of 15 samples. Black pepper and curry powder samples contained aflatoxin B₁ levels ranging from 0.6-3.0 $\mu\text{g kg}^{-1}$. Aflatoxin B₁ was not detected in wheat flour samples. According to the European Union Commission (EC) Regulation, the maximum permissible level of aflatoxin B₁ for spices is 5 $\mu\text{g kg}^{-1}$. According to the results, aflatoxin B₁ values of 5 samples were below the permissible level of the EC but it contained aflatoxin B₁ which can cause harmful effect in long term consumption.

SERVICES PROVIDED

1. ACADEMIC

Sr. No.	Name	Designation	Course	Responsibility
1.	Dr. Mo Mo Win	Deputy Director & Head	Bioterrorism and Forensic Microbiology MMedSc (Medical Jurisprudence) Students	Training and Practical Demonstration
			Biological Toxins and its analytical methods MMedSc (Pharmacology) Students	Training and Practical Demonstration

2. POISON INFORMATION SERVICE

Biological Toxicology Research Division is actively involved in poison information service to provide appropriate informative answers to the clinicians and the public throughout the country. It includes diagnostic strategies and therapeutic suggestions concerned with biological toxins. The answers are given by Land line Telephone -379480 and CDMA mobile telephone- 0973155342. Land line telephone is used during office hours and mobile phone for out-of-office hours.