INTRODUCTION

Amatoxins commonly found in Amanita phalloides is the main constituents of toxins present in most toxic mushroom specimens. It is further classified into three classes of cyclic peptide known as amatoxins, phallotoxins and virotoxins.

Among the three toxins identified the most lethal toxin is amatoxin with a lethal dose 50 (LD50) 0.4–0.8 mg/kg causing death in few days time. The phallotoxins is less toxic with an amatoxin with a lethal dose 50 (LD50) less than 0.1 mg/kg. The compounds of amatoxins have high water solubility and heat stable with resistance to cold temperature; which make them highly toxic.

Overview of Amatoxins

Vetter (1998) first identified and classified the amatoxins as bicyclic octapeptides containing nine subgroups: α-amanitin, β-amanitin, γ-amanitin, ε-amanitin, amanin, amaninamide, amanullin, amanullinic acid, and proamanullin. The compounds of amatoxins have high water solubility and heat stable with resistance to cold temperature; which make them highly toxic.

The kinetics of these toxins after human ingestion has been investigated in recent years. The reports have shown that they are readily absorbed orally and are excreted in the urine as early as two hours within forty eight hours after ingestion. Similarly, Karlson (2003) and Letschert (2006) have reported that the liver is the first organ of contact soon as possible for identifying and quantification of the presence of amatoxins and phallotoxins (Becker et al., 1976).

Identification and Quantification of Amatoxins

If A. phalloides–type mushrooms has been ingested, gastric content as well as mushroom samples should be analyzed as soon as possible for identifying and quantification of the presence of amatoxins and phallotoxins (Becker et al., 1976).

Methods for identification and quantification of amatoxins

1. Evaluation of these toxins in mushrooms has been performed using reversed-phase high-performance liquid chromatography (RP-HPLC) (Enjalbert et al., 2004; Garcia et al., 2015). RP-HPLC is the most commonly used method, although the LC-MS method which provide the most reliable and sensitive results.

2. Capillary electrophoresis coupled to mass spectrometry (MS) (Rittgen et al., 2009)

3. Liquid chromatography (LC) coupled to MS or to tandem Mass Spectrometry (Garcia et al., 2015)

4. UPLC-MS/MS Combined with PRiME HLB Elution (Shuo
Zhang, 2016)

5. The Meixner test is run from the juice of the grounded fresh mushroom tissue onto a piece of newsprint, allowing the spot to dry, and one drop of concentrated hydrochloric acid is added where a blue color indicates a positive test.

6. Methods for urine analysis: Radioimmunoassay, Enzyme Linked Immunosorbent Assay (ELISA) and HPLC (Barceloux, 2008).

RP-HPLC analysis of toxins Chromatography: The method of Ismail Yilmaz et. al, is followed using C18 (Agilent Technologies) at UV detection 303nm for amatoxins and 291nm for phallotoxins. The mobile phase isocratic pump with a flow rate of 1ml/min consisting of 0.05M ammonium acetate (pH 5.5 with acetic acid) and acetonitrile (90:10v/v) [fig 1 & 2].

CONCLUSION

Amatoxins are one of the most toxic mushrooms leading to human fatal cases of mushroom poisoning. Treatment often aims decontamination with drugs and supportive measures. Physicians today faced hurdles in the prognosis of such poisoning cases mainly due to lack of quantification of the toxins present in the mushroom. The geographical variations determine the content of the toxins and it brings a landmark to create awareness to the community for such mushroom specimens. We hope that analyzing the toxin content in the coming years will be of great service to the Physician and the community as well.

REFERENCES