Lethal Poisoning from Yew Tree Needles

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CASE REPORT: The yew tree (Taxus baccata L.) is widely spread all over central and southern Europe. The toxicity of yew has been well known. An 18-year-old woman drank up a decoction of taxus needles from small yew tree in a flowerpot which she bought in a garden-tillage. About 2 hours after her father found her in a comatose state. About 6 hours after drinking of the decoction she died in a hospital. The autopsy findings were nonspecific: hyperemia of the lungs, liver, kidney, spleen, cerebral oedema. In the stomach there were found a few needles on the stomach wall.

METHODS: About 20 mL of gastric content, 20 mL of urine and 5 g of liver were worked up for determination of yew matters. Crude taxine extract as a reference solution was prepared as described by Theodoritis et al. [1] (1 g of tree needles was ground and then extracted with about 50 mL of methanol. The methanolic macerate was evaporated to dryness and the residue was reconstituted with 1 mL of methanol, 0.1 mL of which was applied to a SPEC-C18 (Varian): condition - 1 mL of methanol, 1 mL of deionized water; load sample; rinse - 2 x 1 mL of deionized water, 1 mL of 20% methanol in water, 1 mL of 50% methanol in water; 5 min. vacuum; elute - 2 mL of methanol. The eluate was evaporated to dryness and reconstituted with 0.5 mL of acetonitrile). The same procedure was used for extraction of gastric content. 5 g of liver were homogenized and precipitated with ammoniumsulphate in acid pH and then extracted on SPE (Evidex, 600 mg): condition - 6 mL of methanol, 6 mL of phosphate buffer (pH 6); load sample (pH 6); rinse - 6 mL of deionized water, vacuum (1 min.), 1 mL of n-hexane, vacuum (5 min.); elute - 3 mL of ethyl acetate-methanol (98:2) and 2 x 3 mL of dichlormethane-isopropanol-ammonium hydroxide (4:1:0,1). Combined eluates were evaporated to dryness and reconstituted with 0.2 mL of acetonitrile. Urine was extracted with diethylether after acidification and alkalinization.

Chromatographic separation was achieved by HPLC on a Gemini-C18 column (150 x 2 mm; Phenomenex). MS detection was performed on a single quadrupole with ESI source in positive mode (LC-MS-2010A, Shimadzu). The mobile phase was pre-mixed 0.01 M ammonium acetate buffer with 0.1% formic acid (MFA) and acetonitrile (MFB) used in a gradient mode. A gradient starting with 15% MFB was increased linearly to 90% MFB over 25 minutes, held for 10 min., then decreased to 15% MFB. The flow rate was 0.2 mL/min. The full scan mode in the range m/z 200 - 900.

Analysis was focused on determination of taxine B and isotaxine B with m/z = 583 (protonated molecular ion - 584) and other pseudo-alkaloids of "taxine fraction" [2,3] (with m/z: 541, 567 (2x), 583 (2x), 625 (2x), 651, 667).

RESULTS: The chromatograms of stomach content, liver and urine extracts were compared with the chromatogram of crude taxine extract. In the stomach content all of taxine pseudo-alkaloids of „taxine fraction“ were determined. In liver and urine extracts were found two substances with [M+H]⁺ = 584, with the same retention time as substance in crude taxine and stomach content extracts.

CONCLUSIONS: Based on the history and toxicology findings, the case was classified as a suicide.

Keywords: Yew tree, Lethal poisoning, LC-MS-EST