



“To Study of Extraction and Characterization of Plant Poison Alkaloid – Atropine”

KEYWORDS

Datura stramonium, Atropine, IR Spectroscopy, Thin Layer Chromatography, Forensic Science.

Mr. Dinesh Baban Kamble

Assistant Professor, Shri Vaishnav Institute of Forensic Science, Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Mr. Raj Bhardwaj

Post Graduate Student, Shri Vaishnav Institute of Forensic Science, Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Dr. Kavita Sharma

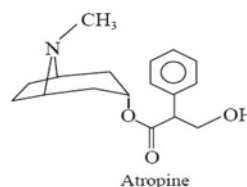
Co-ordinator, Shri Vaishnav Institute of Forensic Science, Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

ABSTRACT Atropine is a tropane alkaloid extracted from jimsonweed (*Datura stramonium*) and other plants of the family solanaceae. *Datura* has been a popular poison for suicide and murder. From 1950 to 1965, the State Chemical Laboratories in Agra, India, investigated 2,778 deaths that were caused by ingesting *Datura* (Preissel and Hans-George, 2002). In forensic and medicinal research there is need of research towards this poisonous alkaloid, last few years number of reports are available for extraction, purification and characterization of Atropine from various ways. We reported here effective and convenient method of extraction of atropine from (*Datura stramonium*) and characterization done through Thin Layer Chromatography and IR Spectroscopy. And also develop the solvent system for atropine and discussed its application in forensic science domain.

Introduction:-

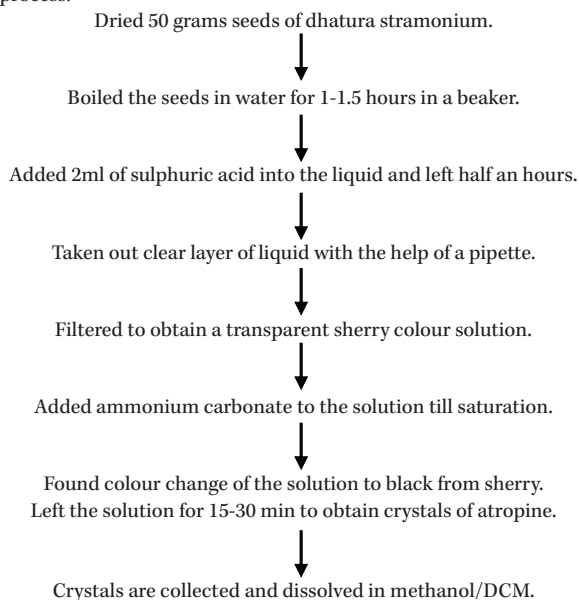
Atropine is a tropane alkaloid extracted from jimsonweed (*Datura stramonium*) and other plants of the family Solanaceae. It is a competitive antagonist of muscarinic cholinergic receptors. It is absorbed from the gastro-intestinal tract, and is excreted in the urine. It is a secondary metabolite of plants and serves as a drug with a wide variety of effects. It is a competitive antagonist for the muscarinic acetylcholine receptor. It is classified as an anticholinergic drug. Being potentially deadly, it derives its name from Atropos, one of the three Fates which, according to Greek mythology, chose how a person was to die. Atropine is a *core* medicine in the World Health Organization's "Essential Drugs List", which is a list of minimum medical needs for a basic health care system. Atropine undergoes hepatic metabolism and has a plasma half-life of 2-3 hours. Atropine is found in many members of the Solanaceae family. The most commonly-found sources are *Atropa belladonna*, *Datura innoxia*, *D. metel*, and *D. stramonium*. Other sources include members of the *Brugmansia* and *Hyoscyamus* genera. The *Nicotiana* genus (including the tobacco plant, *N. tabacum*) is also found in the Solanaceae family, but these plants do not contain atropine or other tropane alkaloids. There are also several reports in the medical literature of deaths from *Datura stramonium* and *Datura ferox* intoxication (Michalodimitrakis and Koutselinis, 1984; Steenkamp et al. In forensic and medicinal research there is need of research towards this poisonous alkaloid, last few years number of reports are available for extraction, purification and characterization of Atropine from various ways. In success of any screening procedure is directly related to the efficacy of the extraction procedure for the compounds of interest. The ideal general screening procedures require that the extraction process extract all the compounds of interest present. The use of solvent extraction procedures typically target compounds of similar polarity and solubility, and multiple extractions with various solvents would have to be performed to cover all the compounds of interest. The dangers and costs associated with solvent extraction have limited the use there of. We found most effective and efficient method of atropine extraction as follows, by applying this method we prepared pure and good quantity of atropine, as follows.

Atropine Structure:-



Methodology:-

In this paper we were used *datura* seeds for extraction of atropine, take dried fruits of *datura* and remove all seeds from it and keep it for 1 or 2 hours for dryness once seeds get dry then start the extraction process.



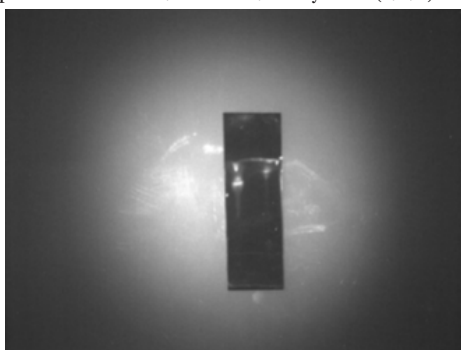
Flowchart:- Extraction Process of Atropine from *datura* seed.

Result:-

After successful extraction of atropine we characterized atropine mainly by Thin Layer Chromatography and Infrared spectroscopy.

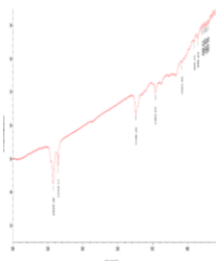
Thin Layer Chromatography:- Crystals are dissolved in methanol

and prepared Thin Layer Chromatography Chamber for development. For that we developed new solvent system for TLC development. Chloroform, Methanol, Diethyl ether (3, 6, 1).



Snap 1:- TLC of Atropine.

Infrared Spectroscopy:- After screening through Thin Layer Chromatography for confirmation we took IR spectra of extracted product and conclude that extracted product was atropine.



Snap 2:- Infrared Spectra of Atropine.

As shown above the IR absorption bands are present in the range of 2929 and 1730 cm^{-1} that is free -OH and carbonyl group respectively. Also we checked melting point, we found MP-116 (Reported MP-118).

Conclusion:-

As we discussed methodology of extraction of atropine from datura seed, it could be utilize in the extraction of atropine from viscera in forensic science laboratory. As we reported above there is need of pure alkaloids, and main source of these alkaloids is plants. Extraction of these plant organs and purification of extracted alkaloids is challenging and requires huge time.

Future Scope:- We have to focus on minimization the solvents to be utilized in extraction procedure and more green approach.

Acknowledgement:- We thankful to professor of Ismail Yusuf College and Institute of Forensic Science, Mumbai providing platform to research work.

Reference:-

- Henderson, L. Smith, E.A., Meloan, C.E., Pickell, J.A., Oehme, F.W. Scopalamine poisoning from homemade moon flower wine. *J. Anal. Toxicol.* 1991;15:216-219.
- Guharoy, S.R., Barajas M (1991). Atropine intoxication after the ingestion and smoking of jimson weed. *Vet. human toxicol.* 33:588-589.
- Extraction of two medicinally active compounds from plant sources Ram Nath Singh*, Jainendra Kumar**, Dinesh Prasad*** & Sidheshwar Prasad**.
- Chemical Reagents and Derivatization Procedures in Drug Analysis* Neil D. Danielson, Patricia A. Gallagher, and James J. Bao.
- Clinical Toxicological Review* (MAR 2001) Vol 23, No 6.
- Simultaneous determination of atropine and scopolamine in different parts of *Hyoscyamus arachnoideus* Pojark plants by high performance liquid chromatography (HPLC) *Naser Hosseini, Samad Nejad Ebrahimi, Peyman Salehi, Behvar Asghari and Mahmood Ahmadi.
- Study of inheritance and environment on tropane alkaloids within *Hyoscyamus* species *Fatemeh Nejadhabibvash*1, Fatemeh Rahmani1, Reza Heidari1, Rashid Jameil and Farzaneh Azimi*.
- Bruneton, J. (1999). Toxic Plant Dangerous to Humans and Animals. Intercept, Hampshire UK P.465.
- Van Wyx, B.E., Van Heerden, F.R., Van Oudtshoorn, B. (2002). Poisonous plants of South Africa. Brinza Publication Pretoria PP. 86-87.

- Dictionary of Natural Products CRC press, CD-ROM, version (2003).
- Van Wyx, B.E., Gericke, N. (2000). People's Plant's, Briza Publications, Pretoria, P.162.
- Vivale, A.A., Acher, A., Pomilio, A.B (1995). Alkaloids of *Datura Ferox* From Argentina. *J. Ethnopharmacol.* 49:81-89.
- Boyd, R., Nichol, N., Wyatt, J.P., Little, K. (1997). Atropine Poisoning After drinking Indian tonic water. *Eur. J. Emerg. Med.* 4: 172-173.
- Awang, D.W., Kindak, D.G. (1989) Atropine as possible contaminants of Comfrey tea. *Lancet* 334:44.
- Lamens, D., De Hert, S., Vermeyen, K (1994). Tea of thornapple Leaves. *Acta Anaestha. Belg.* 45:55-57.
- Ramirez, M., Rivera, E., Ereu, C. (1999). Fifteen cases of atropine poisoning after honey ingestion. *Vet. Human Toxicol.* 41:19-20.
- Once C.L., Othol, D., Mbwana, S.K., Manual I.L. (2003). *Datura Stramonium* mass poisoning in Botswana. *s. Afr. m. Med.*
- Stenken, P.A., Harding, N.M., van Heerden, F.R., van Wyk, B.E. (2004). fetal *Datura* poisoning: identification of atropine and scopolamine by high performance liquid chromatography/photodiode array/mass spectrum. *For Sci Int.* 145:31-39.
- Groszek, B., Gawlikowski, T., Szkolnicka, B. (2000). self-poisoning with *Datura stramonium*. *przeglad Lekarski* 57:577-579.
- Preissel U, Hans-George P. (2002). *Brugmansia* and *Datura*: Angel's Trumpets and Thorn Apples Buffalo, New York: Firefly Books. pp. 106-129.