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Review Article

Screening/Spot/Colour Test of Anti-Depressants

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Abstract

Antidepressants are class of drugs that reduce symptoms of depressive disorders by correctly chemical imbalances of neurotransmitters in the brain. These imbalances may be responsible for changes in mood and behaviour of an individual. In forensic autopsy case, the forensic pathologist may require a complete toxicological investigation for different poisons including Anti-depressents. In India, Forensic Science Laboratories run by Government under the Home ministry usually carry out this The samples have to be analyzed by the forensic Toxicologist/Chemists/ Scientist. This article deals with the screening/spot test for antidepressants in a step-wise manner, which can be of handy reference for the forensic toxicologist.This article is in continuation of toxicology manual series-XVIII, screening/spot test of aphrodisiacs (sex drugs), International Journal of Medical Toxicology & Legal Medicine,Vol.14, No.3 Jan-March 2012.

Keywords: Antidepressants; Screening; Colour; Spot Test etc.

Introduction

Antidepressants are the drugs that are used to relieve the symptoms of depression. They were first developed in the 1950's and have been used on regular basis. Initially used for the treatment of depression in addition to improving one's mood as well as behaviour. The intake of antidepressants enhances the activity of certain chemicals that work in our brain known as neuro transmitters. They pass on the signals from one cell to another. These drugs are advised to the patients suffering from moderate to severe depression illness, severe anxiety, panic attacks, obsessive compulsive disorders and post traumatic stress disorder. They are basically classified on the basis of which chemicals in the brain they affect [1-2].

We have tried to set out standard procedures for screening/spot test for alkaloids which are easily available and useful for the forensic science laboratory. This article covers the spot test/colour test of anti-depressants such as amitriptyline, butriptyline, clomipramine, desipramine, dibenzepin, dosulepin, doxepin, imipramine, iproniazid, isocarboxazid, mebarazine, mianserin, nialamide, nomifensive, nortriptyline, noxiptiline, opipramol, phenelzine, protriptylin, tofenacin, trazodone, trimipramine, viloxazine and zimeldin etc [3-9].

Amitriptyline

Marquis test

1. Two ml of extract is taken in test tube.
2. Few drops of marquis reagent are added to it.
3. Brown to orange colour is observed which indicates the presence of amitriptyline.

Table 1: Classification of antidepressants

S. no	Types	General Information	Examples
1.	Monoamine oxidase inhibition	It is given those individuals who don't respond to any other antidepressants. It must not be taken with certain foods, beverages and medications can cause dangerous interactions.	Phenelzine, tranylcypromine
2.	Tricyclic antidepressants drugs	TCAs are rapidly absorbed from the Digestive tract, bind to plasma proteins, and become widely distributed in tissues as a result of their lipophilic nature. It affects the neurotransmitters norepinephine & serotonin.	Amitryptyline, Imipramine, Clomipramine
3.	Selective serotonin reuptake inhibitors	It affects the serotonin levels in the brain. Serotonin is a chemical neurotransmitters used to treat depression.	Fluoxetine, Sertraline, Citalopram
4.	Serotonin & norepinephrin reuptake inhibitors	It works on two chemical neurotransmitters serotonin as well as norepinephrin. It is used to treat the major depression as well as mood disorders.	Duloxetine, velafaxine
5.	Norepinephrin & dopamine reuptake inhibitors	It works on increasing the level of norepinephrin and dopamine to prevent their reabsorption into the cell.	Buproprion
6.	Combined reuptake inhibitors and receptor blockers	It is useful in two ways firstly it prevents the reabsorption into the nerve cell and at the same time blocking the nerve cell receptors	Trazidone, maprotiline

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Colour changes from brown to green which indicates the presence of amitriptyline.

Sulphuric Acid Test

- Few drops of extract are taken on a white tile.
- Few drops of sulphuric acid are added to it.
- Orange colour is observed which indicates the presence of amitriptyline.

Butriptyline

Marquis test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Violet colour is observed which indicates the presence of butriptyline.

Clomipramine

Forrest Test

- One to two ml of extract is taken in test tube.
- Few drops of forrest reagent are added to it.
- Blue colour is observed which indicates the presence of clomipramine.

FPN test

- Two ml of extract is taken in test tube.
- Few drops of FPN reagent are added to it.
- Blue colour is observed which indicates the presence of clomipramine.

Mandelin's test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Blue colour is observed which indicates the presence of clomipramine.

Libermann's test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Blue colour is observed which indicates the presence of clomipramine.

Desipramine

Forrest Test

- One to two ml of extract is taken in test tube.
- Few drops of forrest reagent are added to it.

- Blue colour is observed which indicates the presence of desipramine.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Colour changes from yellow to blue which indicates the presence of desipramine.

Dibenzepin

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Green colour is observed which indicates the presence of dibenzepin.

Dosulepin

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Reddish brown colour is observed which indicates the presence of dosulepin.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Green colour is observed which indicates the presence of dosulepin.

Marquis Test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Brown colour is observed which indicates the presence of dosulepin.

Sulphuric Acid Test

- Few drops of extract are taken on a spotting tile.
- Few drops of sulphuric acid are added to it.
- Violet colour is observed which indicates the presence of dosulepin.

Doxepin

Libermann's test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Black colour is observed which indicates the presence of doxepin.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Brown colour is observed which indicates the presence of doxepin.

Marquis Test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Brown colour is observed which indicates the presence of doxepin.

Sulphuric Acid Test

- Few drops of extract are taken on a white tile.
- Few drops of sulphuric acid are added to it.
- Orange colour is observed which indicates the presence of doxepin.

Imipramine

Forrest Test

- One to two ml of extract is taken in test tube.
- Few drops of forrest reagent are added to it.
- Blue colour is observed which indicates the presence of imipramine.

FPN Test

- One to two ml of extract is taken in test tube.
- Few drops of FPN reagent are added to it.
- Blue colour is observed which indicates the presence of imipramine.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Blue colour is observed which indicates the presence of imipramine.

Libermann's Test

- One to two ml of extract is taken in test tube.

- Few drops of libermann's reagent are added to it.
- Blue colour is observed which indicates the presence of imipramine.

Iproniazid

Cyanogen Bromide Test

- One to two ml of extract is taken in test tube.
- Few drops of cyanogens bromide reagent are added to it.
- Orange to pink colour is observed which indicates the presence of iproniazid.

Nessler's Test

- Two to three drops of extract is taken in a porcelain basin.
- Two to three drops of nessler's reagent is added to it.
- Agitated and heated the mixture at 100! in water bath.
- Black colour is observed which indicates the presence of iproniazid.

Isocarboxazid

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Red to orange colour is observed which indicates the presence of isocarboxazid.

Nessler's test

- Two to three drops of extract is taken in a porcelain basin.
- Two to three drops of nessler's reagent is added to it.
- Agitated and heated the mixture at 100! in water bath.
- Black colour is observed which indicates the presence of isocarboxazid.

Mebarazine

Palladium chloride test

- Two ml of extract is taken in test tube.
- One ml of palladium chloride solution is added to it.
- Above solution is heated for two minutes.
- Black colour is observed which indicates the presence of mebarazine.

Sulphuric Acid Test

- Few drops of extract are taken on a white tile.
- Few drops of sulphuric acid are added to it.
- Orange colour is observed which indicates the presence of mebarazine.

Mianserin

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Violet colour is observed which indicates the presence of mianserin.

Libermann's Test

- One ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Violet colour is observed which indicates the presence of mianserin.

Nialamide

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Red colour is observed which indicates the presence of nialamide.

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Reddish orange colour is observed which indicates the presence of nialamide.

Nessler's Test

- Two to three drops of extract is taken in a porcelain basin.
- Two to three drops of nessler's reagent is added to it.

- Agitated and heated the mixture at 100! in water bath.
- Black colour is observed which indicates the presence of nialamide.

Nomifensine

Coniferyl Alcohol Test

- Few drop of extract is taken in a test tube.
- A drop of coniferyl alcohol is added on it.
- Yellow colour is observed which indicates the presence of nomifensine.

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Orange colour is observed which indicates the presence of nomifensine.

Marquis Test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Brown colour is observed which indicates the presence of nomifensine.

Nortriptylin

Marquis Test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Orange colour is observed which indicates the presence of nortriptyline.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Colour changes from brown to green which indicates the presence of nortriptyline.

Sulphuric Acid Test

- Few drops of extract are taken on a white tile.
- Few drops of sulphuric acid are added to it.
- Orange colour is observed which indicates the presence of nortriptyline.

Noxiptiline

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Black colour is observed which indicates the presence of noxiptiline.

Opipramol

Forrest Test

- One to two ml of extract is taken in test tube.
- Few drops of forrest reagent are added to it.
- Blue colour is observed which indicates the presence of opipramol.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Colour changes from brown to green which indicates the presence of opipramol.

Phenelzine

Benedict's Test

- One ml of extract is taken in a test tube.
- 0.5 ml of Benedict's reagent is added to it.
- Solution is heated at 100! for 3 mins.
- Orange colour is observed which indicates the presence of phenelzine.

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Orange colour is observed which indicates the presence of phenelzine.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Brown colour is observed which indicates the presence of phenelzine.

Nessler's Test

- Two to three drops of extract is taken in a

porcelain basin.

- Two to three drops of nessler's reagent is added to it.
- Agitated and heated the mixture at 100! in water bath.
- Black colour is observed which indicates the presence of phenelzine.

Palladium Chloride Test

- Two ml of extract is taken in test tube.
- One ml of palladium chloride solution is added to it.
- Solution is heated for 2 mins.
- Black colour is observed which indicates the presence of phenelzine

Protriptylin

Marquis Test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Green colour is observed which indicates the presence of protriptyline.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Colour changes from violet to brown which indicates the presence of protriptyline.

Sulphuric Acid Test

- Few drops of extract are taken on a white tile.
- Few drops of sulphuric acid are added to it.
- Green colour is observed which indicates the presence of protriptyline.

Tofenacine

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Reddish orange colour is observed which indicates the presence of tofenacine.

Marquis Test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Yellow colour is observed which indicates the presence of tofenacine.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Yellow colour is observed which indicates the presence of tofenacine.

Sulphuric Acid Test

- Few drops of extract are taken on a white tile.
- Few drops of sulphuric acid are added to it.
- Orange colour is observed which indicates the presence of tofenacine.

Trazodone

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Violet colour is observed which indicates the presence of trazodone.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Grey to violet colour is observed which indicates the presence of trazodone.

Trimipramine

Forrest Test

- One to two ml of extract is taken in test tube.
- Few drops of forrest reagent are added to it.
- Blue colour is observed which indicates the presence of trimipramine.

FPN Test

- One to two ml of extract is taken in test tube.
- Few drops of FPN reagent are added to it.
- Blue colour is observed which indicates the presence of trimipramine.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Blue colour is observed which indicates the presence of trimipramine.

Viloxazine

Libermann's Test

- One to two ml of extract is taken in test tube.
- Few drops of libermann's reagent are added to it.
- Black colour is observed which indicates the presence of viloxazine.

Mandelin's Test

- Two ml of extract is taken in test tube.
- Few drops of mandelin's reagent are added to it.
- Blue to green colour is observed which indicates the presence of viloxazine.

Marquis test

- Two ml of extract is taken in test tube.
- Few drops of marquis reagent are added to it.
- Yellow colour is observed which indicates the presence of viloxazine.

Zimeldin

Cyanogen Bromide Test

- One to two ml of extract is taken in test tube.
- Few drops of cyanogens bromide reagent are added to it.
- Red colour is observed which indicates the presence of zimeldin

Libermann's Test

1. One to two ml of extract is taken in test tube.
2. Few drops of libermann's reagent are added to it.
3. Brown colour is observed which indicates the presence of zimledin.

Preparation of Solutions/Reagents

Benedict's Reagent

a. 1.73 g of copper sulphate is dissolved in 10 ml of water.
b. 17.3 g of trisodium citrate and 10 g of anhydrous sodium carbonate are dissolved in 80 ml water with heating Solution b is poured in solution a and diluted the mixture up to 100 ml with water.

Coniferyl Alcohol Reagent

0.1 g of coniferyl alcohol is warmed until it melts, dissolved in 3 ml of ethanol and diluted to 10 ml with ethanol.

Forrest Reagent

Equal volumes of a 0.2 % (w/v) solution of potassium dichromate, 30 % (w/v) solution of sulphuric acid, 20 % (w/v) solution of perchloric acid and 50 % solution of nitric acid are mixed.

FPN Reagent

5 ml of 5 % (w/v) ferric chloride solution, 45 ml of 20 % (w/w) solution of perchloric acid and 50 ml of 50 % (v/v) solution of nitric acid are mixed.

Libermann's Reagent

1 gm of sodium or potassium nitrite is dissolve in 10 ml of sulphuric acid with cooling and swirling to absorb the brown fumes.

Mandelin's Reagent

1 g of ammonium vanadate is dissolved in 1.5 ml of water and diluted upto 100 ml with concentrated sulphuric acid.

Marquis Reagent

100 ml of concentrated sulphuric acid is mixed with 1 ml of 40% (v/v) formaldehyde solution.

Nessler's Reagent

a. 50 g of mercuric chloride and 35 g of potassium iodide is dissolved in 200 ml of water and cooled.
b. 50 g of sodium hydroxide is dissolved in 250 ml of water and cooled.
c. The cold solutions of a and b are mixed and made up to 500 ml. The mixture is allowed to stand and decant the clear supernatant liquid for use.

Conclusion

In any analysis of poison, screening/spot test is very useful for knowing the presence of the anti-depressants which can be confirmed by the more confirmatory tests.It saves time for the toxicologist in ruling out the poisons and gives a quick clue to the doctors for patient management in emergency poisoning cases. The result of the analytical methods depends on the amount and purity of the sample extracted. It is important for the forensic toxicologists to know the best available method and help to detect the poison in the crime investigations.

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