C H A P T E R - VI

Pharmacology and anthelmintic activity of leaves of DODONAEA VISCOSA Linn.

As reported previously,* leaves of Dodonaea Viscosa Linn. are used as alternative, laxative and in rheumatism (Nadkarni, 1954). Kirtikar and Basu (1933) as well as Nadkarni (1954) mention presence of gum, albumen, tannin and an alkaloid saponin in the leaves.

Preparation of aqueous and alcoholic extracts :

Leaves of Dodonaea viscoas were collected at the time of flowering, dried in shade and powdered (40 B.S. mesh). Powdered drug was imbibed with chloroform water and set aside for 4 hours. It was then placed in a percolator and macerated with sufficient chloroform water for 24 hours and then percolated. The first portion of the percolate was reserved and the percolation continued till complete exhaustion. The first and the subsequent portions of the percolate were then concentrated under reduced pressure and the concentration was finally adjusted so as to represent 2 g. of the drug in 1 c.c. of the extract.

Alcoholic extract was prepared by complete exhaustion of the powdered drug in a soxhlet extractor with

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90% (v/v) alcohol. Saponin traces were removed in the usual manner and the alcohol strength was adjusted to 70%. The concentration was then adjusted so as to represent 2 g. of the drug in 1 c.c. of the extract. Controls were also kept with 70% alcohol in this case.

Experimental (Plate XV) :

Effect of aqueous and alcoholic extracts on cardio-vascular system :

1. Effect on isolated frog's heart (Fig. 1):

Frog's heart was isolated, perfused with Cyme's canula and kept at a constant pressure..Effect of aqueous and alcoholic extracts are shown at B and A respectively. A_1 indicates the effect of alcoholic extract after the treatment of atropine sulphate (0.2 mg.). Both the extracts caused immediate temporary cardiac standstill. The cardiac effect was unaffected by pretreatment of atropine sulphate.

2. Effect on rabbit's heart and its coronary vessels (Figs. 2) :

Rabbit was made unconscious by headblow. Its heart was taken out carefully and attached to Langendroff's heart perfusion assembly and perfused with

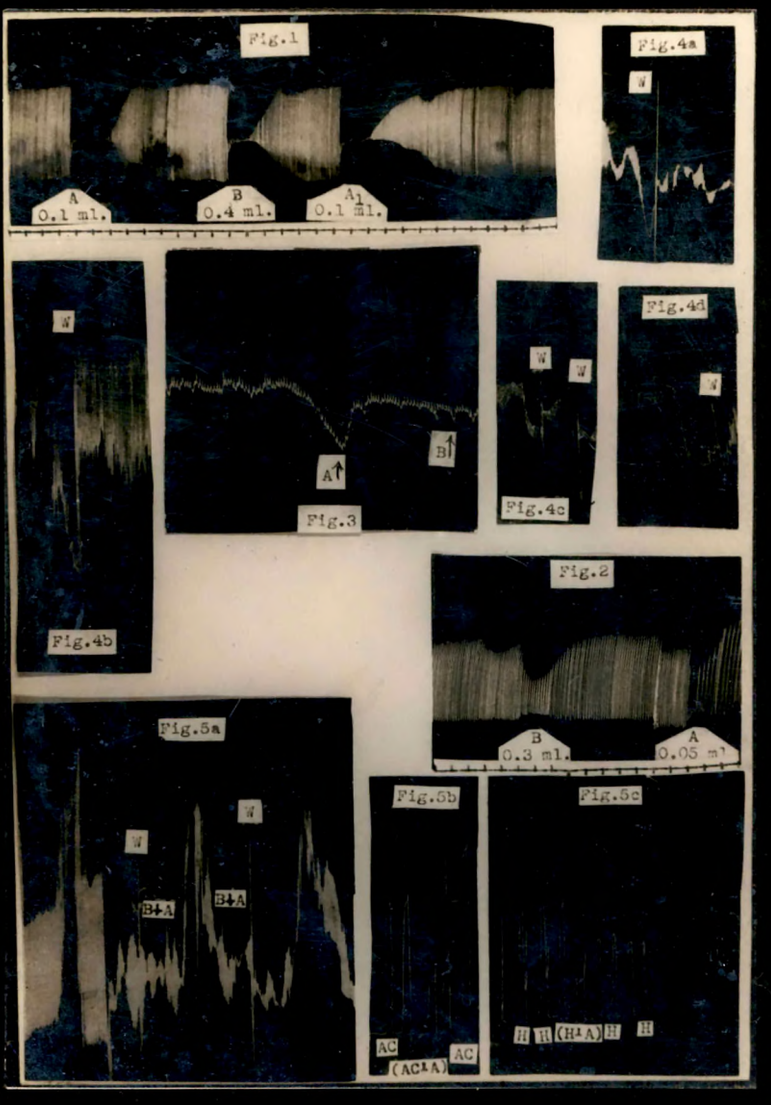
Fig.1
A
0.1 ml.
B
0.4 ml.
A1
0.1 ml.
Fig.4a
W
W
Fig.4b
A
B
Fig.3
W
W
Fig.4c
Fig.4d
W
Fig.2
B
0.3 ml.
A
0.05 ml
Fig.5a
W
W
B+A
B+A
Fig.5b
AC
(AC+A)
AC
Fig.5c
H H (H+A) H H

P L A T E - XV

(Figs. 1 - 5 : *Dodonaea viscosa* Linn.)

Fig. 1 - Effect of the extracts on frog's heart.

Fig. 2 - Effect on rabbit's heart.

Fig. 3 - Effect on blood pressure of cat.

Fig. 4 - 4a, 4b & 4c - Action on rat's and rabbit's duodenum and guinea pig's ileum.

4d- Action on guinea pig's uterus.

Fig. 5 - 5a - Action on barium chloride induced spasm.

5b - Action on acetylcholine induced spasm.

5c - Action on histamine induced spasm on guinea pig's ileum.

A - Effect of alcoholic extract;

AC - Acetylcholine;

B - Effect of aqueous extract;

H - Histamine acid phosphate;

W - Washing.

oxygenated Ringer's solution at 37° C. The effect of 0.1 and 0.3 ml. of alcoholic and aqueous extracts showed the temporary inhibition of the heart as shown in figure 2.

Effect on the coronary vessels was studied by counting the number of drops of perfusate coming out through the coronary vessels per 30 seconds. Coronary outflow was depressed by 41% on injecting 0.05 ml. of the alcoholic extract and 43% on injecting 0.3 ml. of the aqueous extract.

3. Effect on blood pressure of cat (Fig. 3) :

Healthy cats of either sex were anaesthetised with pentobarbitone (30 mg./kg.) intraperitonially. Carotid blood pressure was recorded as usual. The femoral vein was selected for injecting the drug. 0.2 ml. of alcoholic extract showed a small fall in blood pressure while 0.6 ml. of aqueous extract showed no effect.

4. Effect on smooth muscles of intestine and uterus :

4. Action on rat's and rabbit's duodenum and guinea-pig's ileum (Fig. 4):

Duodenums of rat and rabbit and ileum of guinea-pig were suspended in well oxygenated Ringer's solution in an organ bath (25 ml. capacity) at 37°. Both the alcoholic and the aqueous extracts caused marked relaxation of the intestinal pieces in a dose 0.2 ml. and 0.5 ml. respectively (Figs. 4a, 4b & 4c).

Dodonaea viscosa Linn.

Effect on uterus of guinea-pig (Fig. 4d) :

Uterine horn of vergin guinea-pig, previously stimulated with pitocin (1 international unit) was suspended in Dale's solution at 35°. Alcoholic extract showed a relaxation of the muscle while aqueous extract upto a dose 0.4 ml. showed no effect.

5. Spasmolytic effect of alcoholic extract was further studied on barium chloride, histamine acid phosphate and acetylcholine induced spasm as it was found more effective.

Action on barium chloride induced spasm (Fig. 5a) :

Rabbit's duodenum was suspended in well oxygenated Ringer's solution at 37° in a mammalian organ bath (25 ml. capacity). Each contraction in the figure was due to 1 mg. of barium chloride solution. Effect of 0.2 ml. of alcoholic extract at (B + A) showed a complete antagonistic effect of 1 mg. of barium chloride.

Action on acetylcholine induced spasm (Fig. 5b) :

Rat's ileum was suspended in a mammalian organ bath (25 ml. capacity) containing Tyrode's solution at 37°. Each contraction in the figure is due to 1 : 5 million acetylcholine solution. In the figure (AC + A), shows the effect of 0.2 ml. of alcoholic extract. It showed

about 50% reduction of the contraction due to 1 : 5 million acetylcholine.

Action of histamine induced spasm on guinea-pig's ileum (Fig. 5c.) :

Guinea-pig's ileum was suspended in well oxygenated Tyrode's solution at 37°. Each contraction in the figure was due to 1 : 50 millions of histamine acid phosphate. (H + A) in the figure shows about 55% reduction of the spasm induced by histamine acid phosphate (1 : 50 million).

6. Action on rectus abdominis muscle of frog :

Rectus abdominis muscle was suspended in a simple organ bath (25 ml. capacity) containing well oxygenated Ringer's solution at room temperature. Both the aqueous and alcoholic extracts showed neither contraction nor changed the spasm induced by acetylcholine.

7. General effect :

The extracts have not shown any depressent or stimulating effect on albino rats injected subcutaneously (upto a dose of 0.5 ml. and 0.8 ml.); but in case of the alcoholic extract, the animals were slightly depressed but remained active to the stimuli.

Anthelmintic effect :

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The screening test for the anthelmintic property was done according to Shah and Bhattacharya (1959). The dried alcoholic extract of the leaves was dissolved in propyline glycol solution (1.5 ml. to 48.5 ml. in distilled water). Aqueous extract was taken as such. Controls were kept with solvents. Anthelmintic activity was also compared with santonine.

Six earthworms of almost equal size (Pheretima postuma) were kept in 50 ml. of the drug solution. The results of the tests are recorded in the following table:

T A B L E - 22

Extracts	Concentration	Time taken to kill 1/2 the Nos.of earthworms in minutes	Time taken to kill all the earthworms	No.of lives recovered after 24 hours
Alcoholic Ext.	1%	230 min.	360 min.	nil
Aqueous Ext.	1%	300 min.	480 min.	nil
Santonin	1:1000	215 min.	280 min.	nil
Control	-	-	-	6

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S U M M A R Y

Pharmacological studies of the leaves of D. viscosa on various tissues and systems have been studied. Alcoholic extract was found about twice more active than the coronary constricting principles; they also possess spasmolytic activity on smooth muscles and intestine. Alcoholic extract is more effective and also shows a property of releasing the spasm induced by barium chloride, histamine acid phosphate and acetylcholine. It has also a sedative action on uterus of vergin guinea-pig and has a hypotensive effect unaffected by atropine sulphate. Both the alcoholic and aqueous extract are found active against earthworms but the former is stronger in action.

D I S C U S S I O N

Alcoholic extract of the leaves has proved stronger than the aqueous one. Both the extracts possess cardioinhibitary effect and also possess the property of coronary construction in rabbit. The action is a direct one on the muscle as the preatropinisation of the heart does not change the inhibitory action. Both the extracts also show spasmolytic effect. Altoholic extract shows antihistaminic, antibarium and antiacetylcholine effect. The hypotensive effect produced may be attributed to cardio inhibitory action. Spasmolytic activity shown might be due to direct as well as neurotropic effect.