On the pharmacology of an extract of *Avena sativa*

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An alcoholic extract of common oats *(Avena sativa)* has recently been reported to reduce both the craving for, and the number of, cigarettes smoked per day (Anand, 1971). In an attempt to confirm this finding, and with the intent of assessing its efficacy in volunteers attending an anti-smoking clinic, Fee and Marshall (personal communication) prepared a tincture of locally grown (Dundee) oats by macerating three parts of chopped fresh green plant (cut at the stage just before visible flower formation) with ten parts of 90% ethyl alcohol for 72 hours. The tincture was stored at room temperature in brown glass bottles. Attempts were made to estimate the biological activity of this tincture by pharmacological tests in mice.

Aliquots (25 ml) were evaporated to dryness ($<40^{\circ}$ C), reconstituted in 25 ml distilled water and filtered through Whatman No. 1 filter paper immediately prior to testing and administered by stomach tube to female mice weighing approximately 30 g. Since tincture of *Avena sativa* had previously been recommended as a cure for the opium habit (Clark, 1925), the first experiment performed was designed to investigate its effect on morphine-induced analgesia using the hot plate. At a dose of 0.1 ml/10 g body weight administered 1 h before the morphine, the analgesic effect of morphine (10 mg/kg i.p.) was almost completely antagonized when tested 20 min and 2 h after its injection. This antagonism was dose related. Subsequent experimentation in mice showed that similar doses of the tincture: (1) antagonized morphine-induced analgesia using the 'tail flick' method, and (2) reduced the number of nalorphine-induced jumps in mice to which the extract had been administered together with morphine for the last 7 days of a 14 day morphine dependence-producing programme. However, the number of jumps was not reduced when the extract was given 1 h before the nalorphine to mice to which only morphine had been chronically administered.

The extract was without effect on the duration of barbitone-induced anaesthesia or on the amount of bemegride or nicotine required to cause convulsions. On the other hand, the pressor response to intravenously administered nicotine in urethane-anaesthetized rats was significantly reduced.

We next compared the potency of tinctures made from oat seed, brown dry leaves and whole mature plant (excluding roots) with those prepared from green plants grown in various localities. The tincture potencies were assessed in terms of their ability to antagonize the analgesic effect of morphine in the hot plate test. The locally prepared (Dundee) tincture was found to be the most, and the extract of brown dry leaves to be the least, potent in this respect.

Details of the preparation of the tinctures together with a fuller presentation of the results alluded to above will be presented in this demonstration.

We are grateful for valuable discussion with Dr W. Fee and other members of the Scottish Study Group on Smoking and Health.

References

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The use of Etorphine to induce self-injection behaviour in partially restrained rhesus monkeys

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The marked resistance of some rhesus monkeys to voluntarily initiate bar pressing behaviour for cocaine or amphetamine reinforcement has been overcome by instigating a series of hourly injections of Etorphine (0.1 μg/kg) for a period of up to two weeks. These hourly injections were supplemented by daily 4 h training periods during which the animal was taught to associate bar pressing activity with drug reinforcement.

Substitution of amphetamine at the end of the two week period resulted initially in pronounced bar pressing activity as the animal tried to satisfy its demands for etorphine. After a period of 10 to

Table 1 Substitution of amphetamine for etorphine after 12 days of hourly injections of Etorphine (0.1 μg/kg) reinforcement. (Animal 5 kg body weight)

Drug	*Day*	*Reinforcements*	*No. of bar presses* in 4 h session or 2 x 4 h sessions*	*Total presses in day*	*Fixed ratio*
Etorphine (0.1 μg/kg/reinforcement)	1 (a.m.)	60	1083	3777	16
Amphetamine (50 μg/kg/reinforcement)	1 (p.m.)	30	705		16
	2 (a.m.)	30	755	4266	16
	2 (p.m.)	71	3511		32
	3	79	5354	5986	64
	4	48	2557	3048	64 & 32
	5	33	1177	1411	32
	6	39	1107	1338	32
	7	40	797	981	16
	8	31	530	615	16
	9	25	654	850	16
	10	36	682	876	16

* Bar presses made during the actual period of reinforcement (1 min duration) did not count towards the next reinforcement.

14 days consistent, though reduced daily patterns of bar pressing behaviour for amphetamine reward were obtained.

The animals were restrained in the specially designed harness described by Deneau, Yanagita & Seevers (1969) though a flexible spring (Shuster, 1973) was used in place of the rigid pivoted arm described by Deneau *et al.* (1969). After a period of conditioning to the harness and restraint, each animal had a silastic catheter implanted in either its external jugular or femoral vein under general anaesthesia. After operation, each animal was returned to its harness and cage and a series of saline injections (0.9% sodium chloride) containing 10 units of heparin per ml started until the surgical wounds had healed, usually within 5 days. The saline, like all other fluids given during the study, was administered using a Watson Marlow Flow Inducer joined to the intravenous catheter by a permanent catheter passed through the centre of the restraining arm (Deneau *et al.*, 1969).

Following surgical recovery attempts were made to train each animal to press a bar on the outside of the cage which activated the flow inducer and fluid injection. Attempts to facilitate bar pressing activity by adding cocaine (0.05 mg/kg) injection or D or DL amphetamine (0.05-0.1 mg/kg) injection to the saline solution, failed in three out of four animals even when hourly injections were given for periods of up to 8 days. Etorphine (0.1 μg/kg) injection was then given hourly for up to 14 days together with daily periods of training. Consistent bar pressing activity was obtained within 14 days of substituting d or dl amphetamine (0.05-0.1 mg/kg) injection for etorphine and discontinuing the hourly injections (Table 1).

Reference

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