

Short Reports

Effect of Cocaine on Food Intake in Rats

Donna C. Balopole*, Carol D. Hansult**, and Douglas Dorph***

Department of Psychology, State University of New York at Binghamton, Binghamton, N.Y., U.S.A.

Abstract. In rats trained to eat during a five-hour daily period, cocaine (10, 15, and 25 mg/kg) depressed food intake. The anorexia was seen during the 1st h only, with no effect on total food intake.

Key words: Cocaine – Food Intake – Time-course

A decrease in food intake (anorexia) after administration of cocaine has been reported to occur in the rat (Schmidt, 1965; van Rossum and Simons, 1969; Groppetti et al., 1973). However, because these studies used both different drug doses and food measurement intervals to assess the anorexia, no conclusions can be drawn as to the duration of this effect of the drug.

The problem of choosing the appropriate time interval to study anorexia has been discussed with regard to the anorexic effect of amphetamine (Blundell et al., 1976); these authors found that amphetamine produced a powerful initial anorexic effect that decayed after 1.5–2 h.

The duration of cocaine anorexia may also be brief particularly as some of the drug's other effects appear to be quite short-lived (Simon et al., 1972; Nayak et al., 1975). A brief anorexic period could also explain why Costa et al. (1972) failed to report a cocaine anorexia using the same drug dosage but a longer time interval than Groppetti et al. (1973).

* Reprint requests to Donna Balopole, 80-27 254 St., Floral Park, New York, 11004. This work was taken in part from a thesis submitted by DCB in 1976, in partial fulfillment of the requirements for the degree of Master of Arts, Dep't of Psychology, SUNY – Binghamton

** Present address: Endocrine Sciences, Tarzana, California

*** Present address: Dep't of Biostatistics, Mt. Sinai Medical School, New York, N.Y.

This study assessed the time course of cocaine anorexia by using hourly measurements within a fixed feeding period.

Methods

Thirty-six male Sprague Dawley rats (weighing 243–333 g) were habituated to eating powdered Purina Rat Chow for a five-hour period during their 12-h dark cycle and to receiving a saline injection (i.p.) prior to the food session. Animals were housed individually and water was available continuously throughout the study. To test drug effects animals were divided into four groups: three groups of eight animals each received cocaine HCl (10, 15, or 25 mg/kg i.p. in the saline vehicle) prior to the feeding session and 12 animals continued to receive only saline injections prior to the feeding session. Drugs were administered daily for 11 days. Food intake was measured for each hour of the 5-h feeding session on the first and third predrug baseline days and on alternate drug days, beginning with the first drug day and including drug day 2. All data from one rat in the 10 mg/kg group were excluded, however, due to excessive spillage by the animal. Separate repeated measures analyses of variance were performed for the predrug and drug periods. Food intake for the drug period was averaged per hour over the 7 days for each animal prior to analysis.

Results

Experimental groups did not differ in the distribution of intake or total food consumed during the predrug period. For the drug period, however, a significant dose \times hours interaction was found ($F = 5.13$, $df = 12/124$, $P < 0.001$) although again total food intake over the 5 h (Dose, $F = 0.38$, $df = 3/31$, $P = n.s.$) was essentially the same for all groups. Administration of cocaine decreased food intake for the 1st h when compared to controls; in the four remaining hours drug-injected animals consumed more per hour than controls (Fig. 1).

While cocaine administration did not affect total food intake, all experimental groups were found, however, to have a higher total food and water intake on days (pre drug and drug) when hourly measurements were taken as compared to days when only total

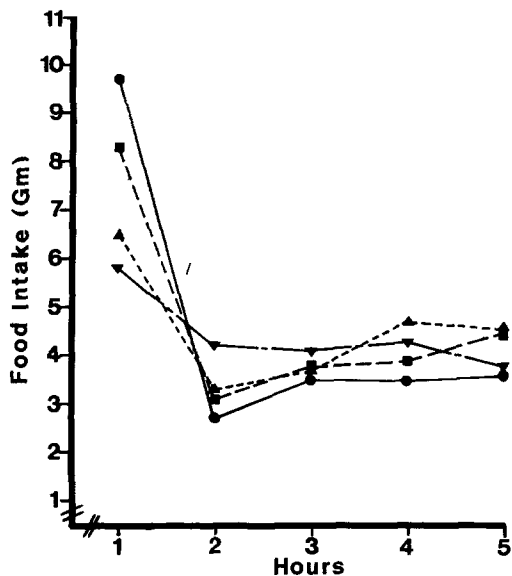


Fig. 1. Mean food intake following injection: ●—● saline; ■—■ 10 mg/kg. ▲—▲ 15 mg/kg; ▼—▼ 25 mg/kg cocaine

intake measures were taken. This would indicate that the presence of experimenter and recording of measurements had some effect on the intakes of all animals.

Discussion

Administration of cocaine (10, 15, and 25 mg/kg) produced a transient and dose-related decrease in food consumption in rats. This cocaine-induced inhibition of eating is in accordance with previous studies, none of which, however, evaluated the time course of this effect of the drug (Schmidt, 1965; van Rossum and Simons, 1969; Groppetti et al., 1973).

In the present study, cocaine had a short-lived anorexic effect, which lasted no more than 1 h. As the drug's action wore off, animals overconsumed in comparison with controls and thus total intake under the 19-h deprivation regimen was the same for drugged and non drugged animals. A second study using these same animals with a new source of cocaine revealed the

same drug induced effects, with differences between groups accentuated.

These results might explain why Groppetti et al. (1973) reported a $\frac{1}{2}$ h anorexia for their 3 mg/kg cocaine i.v. rats, while Costa et al. (1972) using the same i.v. dosage failed to find a depression of eating at the end of their animals' 2-h feeding session. Findings of a short half life in rat brain (0.4 h) for an i.v. injection of 8 mg/kg [3 H]cocaine, (Nayak et al., 1975) also confirms that the drug has a transient effect.

A brief anorexic effect of cocaine can also be inferred from a study by Heffner et al. (1977), which was published after the completion of our experiments, but there only the intake following the 1st h of the 4-h feeding session was measured and the pattern of eating was not directly shown.

References

- Blundell, J. E., Latham, C. J., Leshem, M. B.: Differences between the anorexic actions of amphetamine and fenfluramine—possible effects on hunger and satiety. *J. Pharm. Pharmacol.* **28**, 471–477 (1976)
- Costa, E., Groppetti, A., Naimzada, M. K.: Effects of amphetamine on the turnover rate of brain catecholamines and motor activity. *Br. J. Pharmacol.* **44**, 742–751 (1972)
- Groppetti, A., Zambotti, F., Biazzi, A., Mantagazza, P.: Amphetamine and cocaine on amine turnover. In: *Frontiers in catecholamine research*. E. Usdin, S. H. Snyder, eds., pp. 917–925. New York: Pergamon Press 1973
- Heffner, T. G., Zigmond, M. J., Stricker, E. M.: Effects of dopaminergic agonists and antagonists on feeding in intact and 6-hydroxydopamine-treated rats. *J. Pharmacol. Exp. Ther.* **201**, 386–399 (1977)
- Nayak, P. K., Misra, A. L., Mule, S. J.: Physiological disposition and biotransformation of [3 H]cocaine in acute and chronically-treated rats. *Fed. Proc.* **34**, 781 (1975)
- Schmidt, G.: Über die anorexigene Wirkung des Cocains. *Arch. Int. Pharmacodyn.* **156**, 87–99 (1965)
- Simon, P., Sultan, Z., Chermot, R., Boissier, J. R.: La cocaine, une substance amphétaminique? Un problème de psychopharmacologie expérimentale. *J. Pharmacol. (Paris)* **3**, 129–142 (1972)
- van Rossum, J. M., Simons, F.: Locomotor activity and anorexigenic action. *Psychopharmacologia (Berl.)* **14**, 248–254 (1969)

Received November 21, 1977; Final Version January 16, 1979