Effects of Chlordiazepoxide and Diazepam on Feeding Performance in a Food-Preference Test

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Abstract. Chlordiazepoxide (5 and 10 mg/kg) and diazepam (2.5 mg/kg) reduced the latency to eat and enhanced feeding response to familiar food in a food-preference test. The increased feeding response resulted from an increased frequency of individual eating episodes (bouts) without significant change in the episode duration. Experiment II indicated that this facilitatory action of the two drugs was not dependent on the presence of principal novelty cues in the food-preference test. Diazepam (5 mg/kg), in contrast, enhanced the feeding responses to novel food in the food preference test. Experiment III demonstrated that although diazepam can counteract induced food neophobia, its facilitatory action on the response to novel foods may be mediated by a mechanism which can operate independently of food neophobia.

Key words: Chlordiazepoxide – Diazepam – Food neophobia – Food preference – Foot shock – Novelty

Increasing the preference for novelty foods has been found, however, following treatment with the neuroleptic compound spiperone (Cooper et al., 1979). An analysis of feeding performance revealed subtle behavioural changes produced by spiperone. Firstly, it prolonged the mean duration of individual eating episodes (bouts) irrespective of whether these were devoted to familiar or novel foods. Secondly, it produced a selective increase in the frequency of eating episodes devoted to novel foods. After spiperone, therefore, rats showed an increased frequency of initiating episodes of eating novel food (Cooper et al., 1979). A principal aim of Experiment I was to examine the effects of two benzodiazepines, (CDP) and diazepam (DZ) in a food-preference test, at this detailed level of behavioural analysis. A subsidiary aim was to determine if benzodiazepine treatment could produce the sort of effect that would be consistent with an action to reduce food neophobia, as predicted by Poschel (1971).

Experiment I

Materials and Methods

Animals. The subject were 75 naive male Sprague-Dawley rats supplied by OLAC Southern Limited. They were allocated into groups of four per cage (North Kent Plastics, RM2) and supplied with standard laboratory food pellets (Diet 41 B, Robert Morton Limited) and tap water ad libitum. Room temperature was maintained at 21–23°C and humidity of < 50%. Room illumination operated on a 12-h light-dark cycle (lights on 7 a.m.). The rats weighed 250–280 g at the time of testing.

Apparatus. The food-preference test was conducted in a Bowman's MRC-type rat cage with a wire grid floor (apertures 0.4 cm square). Six round plastic trays (diameter 5.5 cm, rim height 1.1 cm) were placed on the floor grid. Before each food-preference test, six types of food were freshly prepared and placed in the containers: the familiar food pellets and the novel foods (apple, carrot, cheddar cheese, Whittworth's currants and McVitie's milk chocolate wholemeal biscuits). All foods were prepared in comparably sized pieces and equivalent volumes were placed in a shallow pile in each dish. There was one type of food per dish.
Procedure. The animals were handled each day for 14 days after arrival in our laboratory as a taming procedure. Each rat was deprived of food after 4 p.m. on the day prior to the test day. On the test day, each animal was tested individually and placed for 10 min in the test cage. The first measure recorded was latency (s) before feeding. Subsequently, the time spent eating was recorded separately for each type of food. The data was recorded in terms of duration of individual eating episodes. Eating duration was recorded only when food was taken into the mouth and chewed. Any time spent in contact with food without eating was not scored. After each trial, if necessary, each food container was replaced into position and refilled. Any spillage was removed.

Injections. Each injection was given 30 min before the beginning of the test session. The rats were randomly assigned to five groups: 5 mg/kg CDP (N = 16); 10 mg/kg CDP (N = 15); 2.5 mg/kg DZ (N = 15); 5 mg/kg DZ (N = 15); and isotonic saline (N = 14). CDP HCl was dissolved in isotonic saline and DZ was used, as supplied by Roche Products, in ampules. Injections were given IP in a volume of 1.0 mg/kg.

Data Analysis. The data were analysed using a t-test for independent groups, comparing drug-treated groups with the control group.

Results and Discussion

Latency to Eat. Both CDP and DZ significantly reduced the latency to begin eating (s) in the food-preference test (Fig. 1A). The strongest effect was produced by 5 mg/kg DZ. The effects of the two CDP doses did not differ; however, the effects of DZ were dose-related.

Total Eating Duration. The total eating duration (s) comprises the sum of all eating episodes within the 10-min test. Both CDP and DZ increased the total eating duration (Fig. 1B), their effects being dose-related. The most pronounced effect was produced by DZ (5 mg/kg) which virtually doubled the time devoted to feeding in the test.

Type of Food Chosen. The total eating duration can be subdivided into the time devoted to eating familiar food and the time devoted to eating novel foods. Two distinctly different actions of the drugs emerged (Fig. 2). In the case of CDP, there was a dose-related increase in the time spent eating familiar food with no change in the response to the novel food (Cooper and Crummy, 1978). The effect of the lower dose of DZ was closely similar. The 85% increase in feeding duration produced by DZ (2.5 mg/kg) was due to an increase in eating the familiar food. However, at the higher dose of DZ quite a different action emerged. DZ (5 mg/kg) produced a strong stimulation of feeding devoted to the novel foods and produced no significant change in the response to familiar food (Fig. 2). The effect was quite remarkable, increasing the duration of feeding devoted to the novel foods from under 50 s for control animals, to almost 250 s for the DZ-treated animals. Between 2.5 and 5 mg/kg DZ, therefore, there was a complete reversal in the action of the drug from a selective facilitation of the response to familiar food to a selective facilitation in favour of the novel foods.

Eating Episode Duration. Control animals discriminated very clearly between familiar and novel foods in terms of the mean duration of individual eating episodes (Fig. 3A). The mean duration for an episode of familiar food eating was about three-times that of novel food eating. Neither CDP nor DZ exerted any significant effect on the duration of familiar food eating episodes (Fig. 3A). CDP (10 mg/kg) and DZ (2.5 mg/kg) were equivalent in producing a moderate increase in the duration of novel food eating episodes. DZ (5 mg/kg) produced a striking increase in the duration of novel food eating episodes; so much so that