Background Binge-eating disorder (BED) is a psychiatric condition characterised by compulsive, perseverative bouts of excessive consumption of palatable foods. Binge-eating is not associated with inappropriate compensatory purging, BED can be linked with obesity, but not all subjects with BED are overweight or obese with a significant proportion of subjects being in the normal body weight range. Lisdexamfetamine (LDX), a prodrug of d-amphetamine, is approved to treat ADHD and it has recently also gained approval in the US for the treatment of moderate to severe BED in adults (1).

Rats given irregular, limited access to chocolate maintain normal weight, but at the same time they develop robust binge-eating (BE). We have previously reported that LDX decreases chocolate bingeing (2) and in this study, we have investigated whether BE rats show compulsive and perseverative behaviour in response to access to chocolate.

METHODS

Thirty-four adult, female, Wistar rats with continuous access to standard chow and water were given intermittent 2 hr access to chocolate for 28 days. Non-binge (NB) controls were given an empty pot on the binge day. BE and NB rats were trained in the basic conditioned avoidance response (CAR) test in 15 min, 2-chamber shuttle-box, ie a tone/light stimulus was paired with a mild foot shock 10 s later if the rats did not move to the adjacent compartment. After CAR training, a chocolate-filled test pot was placed in the shuttle box. When the rat entered the chamber, the conditioned stimulus was presented after a variable interval following 10 s after a foot shock if the rat did not leave. Rescuing the rat from the ‘safe’ compartment without the pot did not initiate a trial and no foot shocks were given. LDX (0.8 mg/kg po) or vehicle (de-ionised water, 3 ml/kg po) was administered 15 min before the test. Tests were only initiated by a rat entering the compartment with the pot. BE rats spent 39 ± 14 s in the chocolate-paired compartment (74% of the session) compared with 237 ± 10 s (65%) for NB controls (p<0.05). BE rats responded to the warning and left before receiving a foot shock (avoidance) in 78% of the trials compared with 98% for NB rats (p<0.01). The mean total escape time when BE rats tolerated foot-shocks and terminated the trial was <5 s greater than the NB controls (p<0.05). LDX reduced BE rats’ chocolate consumption by >50% (p<0.01). Decreased % escapes and total escape time were all significantly reversed (p<0.05) by LDX pretreatment. There was also a strong trend (p<0.05) for LDX to reduce the increased time spent in the chocolate-paired compartment by BE rats.

RESULTS

Figure 1 shows that there was no difference between the BE rats and NB controls for the rate of acquisition or proficiency in performing the CAR test. Figure 2 shows that BE rats consumed 35.2 ± 4.0% of their daily food intake in 2 hr chocolate bingeing. NB and BE rats were trained in the basic conditioned avoidance response (CAR) test in a two-chamber shuttle-box, ie a tone/light stimulus was paired with a mild foot shock 10 s later if the rats did not move to the adjacent compartment. After rats were proficient in the CAR, the model was altered to a food-associated conflict test. A chocolate-filled jar was placed in 1 compartment of the shuttle-box. If the rat entered the chamber with the chocolate, the conditioning stimulus was then presented after a variable interval and if the rat did not leave it received a foot-shock 10 s later. Residence in the ‘safe’ compartment without a pot did not initiate a trial or administration of foot-shocks. LDX (0.8 mg/kg po [d-amphetamine base]) was tested. Results are presented as mean ± SEM.

CONCLUSIONS

BE rats showed compulsive and perseverative behaviours in this novel food-associated conflict test. LDX decreased chocolate bingeing and reduced the compulsive and perseverative behaviours of BE rats in the model.