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**ABSTRACT**

Compared the mating behavior of 7 ovariectomized Weizman B-1 rats after an intraperitoneal injection of 1 ml of ethanol/kg of body weight or saline. After ethanol the mean ratio of frequency of lordosis to frequency of mounts and intromissions was .35, and mean duration of lordosis, 6.4 sec. After saline, the ratio was .96 ($p < .05$), and mean duration, 2.35 sec. Normal lordosis response occurred 9% of the time after ethanol and 86% of the time after saline, and weak lordosis response, 93 and 25%, respectively. When the females were treated with ethanol, the 7 males had significantly longer mean latencies to intromission and ejaculation and an increase in the number of mounts. The decrease in lordosis frequency is attributed to the influence of ethanol on the spinal centers, and the increased duration of lordosis is interpreted as reflecting a diminution of cortical inhibition. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

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# Effects of Alcohol on Mating Behavior of the Female Rat[1]

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SUMMARY. *Following intraperitoneal injections of alcohol, female rats exhibited impaired lordosis responses. The changes in mating behavior are attributed to a suppressive influence of alcohol on spinal centers and on cortical inhibition.*

DESPITE the widespread use of alcohol, its effects on copulation have not been extensively studied. Moreover, none of the reported experiments have investigated its effects on the mating behavior of females. Ford and Beach (1) and Gebhard (2) note that in humans, contrary to the popular notion, alcohol has a harmful effect on erection and orgasm. Dewsbury (3) reported that in the male rat alcohol administration may be followed by a deterioration in mating behavior without considerably affecting motor functions. Hart (4), working with both spinal-transected and intact male rats, found that alcohol does not adversely affect sexual motivation, although copulatory performance related to spinal reflexes declined markedly. This conclusion fits Gantt's (5) and Hart's (6) observations on dogs.

In the present study we investigated the effects of alcohol on mating behavior of female rats. We hypothesized that alcohol would suppress the lordosis reflex, thus diminishing copulatory performance.

## METHOD

*Subjects.* Seven ovariectomized females and seven intact male rats of the Weizman B-1 strain were the subjects. All had mating experience prior to the beginning of the experiment and were about 9 months old. They were kept on a reversed daylight cycle, the lighted portion of which began at 7 PM and ended at 7 AM.

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*Hormonal Treatment.* Estrus was induced by intramuscular injections of 0.1 mg of estradiol benzoate 72 hours before the mating tests and 0.4 mg of progesterone 4 hr before.[2]

*Mating Tests.* The tests were conducted in a plywood box (67 × 31 × 36 cm) with a plexiglass front. Five minutes before the beginning of the test a male was placed in the observation box. An estrous female, which had been injected with either alcohol or saline, was then put in the box. The timing and frequency of copulatory activities by the male and the female were recorded on a 4-channel event recorder.

The recorded male behavior included complete and incomplete mounts, intromissions and ejaculations. The occurrence of lordosis by the female in response to complete or incomplete copulatory acts by the male was also recorded. Duration of the lordosis reflex was measured by means of a stopwatch. Preliminary observations had shown that after the administration of alcohol the lordosis did not reach its normal magnitude, and although the female's hindquarters were raised from the floor, the lumbar spine did not assume the upward curvature typical of the "normal" reflex. In the experimental situation, therefore, an observer classified the lordosis reflexes as either "normal" (exhibiting an upward curvature of the spine) or "reduced" (lumbar spine parallel to the floor).

The test continued through the first intromission after ejaculation. The test was terminated at 30 min if ejaculation after the first intromission was not achieved or if no intromission had occurred after 15 min.

*General Procedure.* Each female was tested twice with the same male, and thus served as her own control. Four of the females were tested first while under the influence of alcohol and the second time after saline; the order of testing was reversed for the other 3. The second test was conducted 10 days after the first.

The estrous female to be tested received an intraperitoneal injection of 1 ml of absolute ethanol per kg of body weight or an equal volume of saline and, after 5 min, was placed in the observation box and the test was started.

## Results

Two of the females did not receive any intromissions while they were under the influence of alcohol, in spite of the fact that the males repeatedly attempted to mount them. In contrast, all of the copulations under the control condition resulted in insertions and ejaculations within the predetermined time limits. The failure of the males to achieve intromissions was apparently the consequence of impaired lordosis by the females.

*Female Behavior.* The mean lordosis quotient (LQ = frequency

[2] Di-oestrogyn, 5 mg per cc, and Progestin, 25 mg per cc. We are grateful to Assia, Ltd. for donating these hormones.

of lordosis/frequency of mounts and intromissions) of the females after alcohol was .35, compared with a mean LQ of .96 by the same females after saline. The difference between the groups is significant at the .031 level, by randomization test for matched pairs, two-tailed (7).

Duration of lordosis, on the other hand, was much longer after alcohol than after saline. After alcohol the mean duration of lordosis was 6.4 seconds, compared with a mean of 2.35 sec after saline. This difference is also significant at the .031 level. Some of the lordosis responses after alcohol were so prolonged that the male performed two mounts in succession before the female lowered her hindquarters.

Most of the lordosis responses displayed by the females following saline were of the normal (type I) magnitude; sometimes, however, the weaker (type II) lordosis was seen, characterized by somewhat raised hindquarters without the strong upward deflection of the spine. After alcohol these proportions were reversed: type II lordosis was predominant, type I occurring very rarely. It should be noted that after both alcohol and saline there were a few cases in which both types could be clearly distinguished in the same response. Such responses characteristically consisted of an initial type I lordosis after which the female lowered her hindquarters and stayed for an additional period of time in the type II position. These composite responses were scored as both type I and type II. The relative frequency of each type of lordosis was calculated by dividing the frequency of the type by the total frequency of lordosis. The relative frequency of type I after saline was .86 and after alcohol, .09, that of type II, .25 and .93, respectively. The differences between the conditions are significant at the .031 level (two-tailed randomization test for matched pairs).

Although some of the females showed a mild ataxia, they approached the males as readily after alcohol as they did after saline. The mean latency to first approach by alcohol-treated females was 221.6 sec, compared with a mean of 294.8 sec after saline. This difference does not reach statistical significance.

*Male Behavior.* The mean number of complete mounts of the alcohol-treated females was 12.7, of the saline-treated, 5.8; number of incomplete mounts, 8.7 and 1.7; latency to the first intromission, 357.2 and 12.8 sec; latency to ejaculation, 607.0 and 367.2 sec. The differences between the latencies to intromission and to ejaculation

and between the total number of complete and incomplete mounts are significant ($p = .035$, by two-tailed randomization test for matched pairs).

## Discussion

The results of this study show that alcohol administration to the female has deleterious consequences on mating behavior. Undoubtedly the most harmful effect of alcohol under the present conditions was the diminution of the probability of the occurrence of lordosis in response to copulatory actions of the male. Once the female's tendency to exhibit lordosis was reduced, the male's ability to achieve intromissions declined, which may account for the enhanced number of mounts and the increased latencies of intromission and ejaculation.

The seemingly paradoxical phenomenon of increased duration at the same time as a decrease in LQ and in the strength of lordosis following alcohol injection needs some attention. According to Beach (8), the lordosis is a spinal reflex which is normally subject to an inhibitory cortical control. Once the cortical influence is removed by surgical or chemical means, the strength and duration of the lordosis reflex are increased (8, 9). The effects of alcohol as seen in the present study, therefore, seem to reflect the suppression of both spinal centers (resulting in reduced LQ and strength of lordosis) and cortical inhibition (hence the enhanced duration of the reflex).

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