IJAS Iranian Journal of Applied Animal Science

Fear Response in Roosters Orally Exposed to Alcohol: An Alternative Animal Model

Short Communicaion

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Received on: 24 Sep 2013
Revised on: 19 Oct 2013
Accepted on: 30 Oct 2013
Online Published on: Sep 2014

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Online version is available on: www.ijas.ir

ABSTRACT

Effect of ethanol consumption on fear response in human and conventional animal models (rodents) is controversial. The present study aimed to investigate the effect of ethanol administration on fearfulness in poultry as an alternative animal model. Being a reliable measure in avian species, tonic immobility was used to evaluate the fear response in 60 roosters orally administered with ethanol. Duration of tonic immobility was higher in alcohol-exposed birds compared to the control birds ($P<0.05$), suggesting that dosing the roosters with ethanol was associated with an increased fear response which makes poultry as a plausible alternative model in behavioral studies.

KEY WORDS bird, ethanol, fear response, tonic immobility.

INTRODUCTION

The consumption of large doses of ethanol results in an intoxication, making acute respiratory failure or death (Sahn *et al.* 1975). Ethanol impairs judgment and performance in humans (Pickworth *et al.* 1997), associated with reckless or irresponsible behavior (Hull and Bond, 1986). Chronic consumption of ethanol has neuropathological consequences on cognitive functions and brain structures (Fadda and Rossetti, 1998). Ethanol modifies offense / defense behaviors. Low doses of ethanol are reported to increase offense, but failing to affect defense in rats; however, higher doses decreased the offense and increased the defense behavior (Miczek and Barry, 1977).

It has been suggested that increase in the dosage of ethanol reduced freezing and fear responses in rats (Blanchard *et al.* 1988). Other reports showed that ethanol suppressed startle reflex in rats (DeTurck and Pohorecky, 1987). In a primary study on alcohol and startle reflex in humans, it was reported that overall startle reactivity is diminished by alcohol (Stritzke *et al.* 1995); however, later reports suggested that alcohol did not increase distress reactions or distress responses to threatening stimuli (Curtin *et al.* 1998). Effect of alcohol consumption on stress is inconsistent in human studies (Morean and Corbin, 2010) where data showed that intoxication did not invariably reduce distress (Sayette, 1993).

The number of studies addressing the dampening effect of alcohol on stress is almost comparable to those with reverse findings. Pilot studies to establish the efficiency of a specific drug or a medical procedure mainly rely on animal models, including rat, mouse, hamster, and rabbit. Comparing the responses in animal models to a specific treatment would be informative. Furthermore, introducing an alternative model to the current ones which are typically used to study the effects of alcohol might be beneficial. Due to a paucity of information on avian species, the present study aimed to investigate the effect of using alcohol on fear response in domestic fowl by a reliable procedure (tonic immobility) to study the fear response (Gallup, 1979). The

study may unravel the difference in response to alcohol and introduce a new experimental model.

MATERIALS AND METHODS

Birds and experimental groups

Sixty 24-wk-old Iranian native breeder roosters (average weight 1741±179.45) were obtained commercially (Research Center of Fars Native Chickens, Shiraz, Iran) and maintained at 21 °C and a 15 L:9 D photoschedule.

A total of 30 birds served as the experimental group (alcohol-exposed; group A) and the other 30 birds as the control (group C) which received common water as a sham operation. A pilot study showed that the minimum effective dose of ethanol (50% v/v) to induce behavioral effect was 5 mL. Birds in group A orally received a volume of 5 mL ethanol; but, the birds in group C received 5 mL drinking water.

Two observations were conducted for each bird. In experimental group, each bird was first observed for the duration of tonic immobility prior to alcohol administration and observed for the second time 10 minutes after ethanol administration.

Tonic immobility test

Birds were individually moved to a separate room, without a visual contact to other birds, and subjected to tonic immobility measurements wherein righting times were scored. Tonic immobility was induced as soon as the birds were carried to the separate room by gently restraining of the bird for 10 s on the back with the head hanging in a U-shaped wooden cradle (Jones and Faure, 1981). The experimenter then retreated approximately 1 m and remained within the sight of the bird without making a noise or movement. A stopwatch was started to record latencies until the bird righted itself. If the bird did not show a righting response over the 10-min-long observation period, then a maximum score of 600 s was given for righting time. Each bird was tested twice and the average was recorded as the mean duration of the response.

The experimenter was blind to the treatments administered. Two-tailed paired samples t-test (SAS, 2002) was used to test the effect of ethanol administration on duration of tonic immobility. Statistical significance was considered at $P < 0.05$.

RESULTS AND DISCUSSION

The average duration times of tonic immobility in group A were 124 ± 22.8 and 194 ± 19.7 s for the first and second observation, respectively. The difference between averages was significant [t (29)= -3.06, P<0.01] which suggests an increase in duration of tonic immobility when birds received ethanol. For group C, the difference between two observations was not significant, [t (29)= -0.102, P= 0.92]. The average durations of tonic immobility were 155 ± 17.9 and 158 ± 24.0 s for the first and second observations.

CONCLUSION

The present study provided a preliminary data on the effect of ethanol on fear response in roosters. Results showed that administration of alcohol increased the tonic immobility duration in cockerels, suggesting an increase in fear response following the alcohol consumption. Tonic immobility is an unlearned fear response induced by a brief physical restraint and characterized by a marked autonomic nervous system involvement. Birds with short duration of tonic immobility adopt an active fighting strategy; whereas, those with long lasting one stay immobile once challenged (Jones, 1996). Although the effect of alcohol on fear and stress response has been inconsistent in investigations that used human participants (Moberg *et al.* 2011), the reports showed a suppressive or depressive startle reflex in rats (De Turck and Pohorecky, 1987; Pohorecky *et al.* 1976). From a behavioral standpoint, the current study showed that ethanol increased fear response in birds, but this paper also suggested that cognitive investigations may be implemented to study the fear response in animal models.

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