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Pharmacologic Studies of "Catnip Tea": The Hot Water Extract of *Nepeta Cataria*

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Catnip (*Nepeta cataria L.*), a member of the mint family, is widely distributed in both the United States and Europe. It is well known that catnip is a potent behavior-altering drug and/or hallucinogen in domestic cats (Hatch, 1972) and large wild cats (Leyhausen, 1973), but unfortunately the original observations are lost in antiquity.

In addition to its wide distribution in the wild, catnip is available from a wide variety of commercial sources (i.e. pet stores, supermarkets, herb stores, seed supply stores, etc.) for use in making toys for cats or for use as a herbal remedy for humans. As a herbal remedy, catnip tea (i.e. the hot water extract), and to a lesser extent, catnip tincture (i.e. the alcohol extract), are reportedly commonly prescribed by naturopaths, herbalists, folk doctors, etc. in both the United States and Europe (Lust, 1974; Kloss, 1975; Kuts-Cheraux, 1953). Unfortunately, there is relatively little or no statistical information about the number of people who use herbal remedies in general, or catnip in particular. There are also no data about the level of use of herbal remedies among people who do use them. The professional organizations of two groups, the naturopaths and homeopaths, which together account for approximately 12,000 licensed practitioners in the U.S. (McTaggart and McTaggart, 1976), who routinely use herbal or "natural" remedies in the course of their treatments, were unable to provide any statistical information (National Center for Homeopathy, 1978; Homeopathic Council for Research and Education, 1978; National Association of Naturopathic Physicians, 1978), even though catnip is listed in the naturopath dispensatory (Kuts-Cheraux, 1953). For folk doctors and/or herbalists who practice among minorities such as Native-, Mexican-, Afro-, Puerto Rican-, and Hawaiian-Americans, religious sects such as the Amish, River Brethren, Shakers, etc., there are virtually no data.

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According to one commonly used recipe, one pint (i.e. approximately 473 ml) of boiling water is poured over one ounce (i.e. approximately 28 g) of dried catnip and the mixture is allowed to steep in a closed container for approximately one hour and then filtered. The dose of this catnip infusion is approximately one cup per day, administered in 1-3 tablespoon lots, at periodic intervals (Hutchens, 1973). It is commonly prescribed for nervous, stomach, and respiratory problems (Lust, 1974; Kloss, 1975; Kuts-Cheraux, 1953; Krochmal and Krochmal, 1973). When catnip is prepared in this way, an average dose of 3 tablespoons contains approximately 144 mg of a solid greenish-black residue upon evaporation of the water.

Since catnip is widely available and is commonly recommended by herbalists for a variety of problems, and since virtually nothing is known about the constituents of the "catnip tea" and/or their mechanism and/or site of action, we decided to begin to elucidate the basic pharmacology of this catnip preparation. It seems especially important since another catnip preparation, catnip smoke, is reported to be a mild hallucinogen with a "cannabis-like" effect (Jackson and Reed, 1969). Since the young chick has a fairly limited behavioral repertoire and since it is known to respond to other catnip preparations (Sherry and Hunter, 1978; Sherry and Koontz, 1978) as well as other psychotropic and/or hallucinogenic drugs in a relatively stereotyped manner (Sherry and Burnett, 1978; Spooner and Winters, 1966; Wallach et al., 1972), we decided, as a first step in determining the mechanism of action of this drug, to determine what effect it has on the behavior of the young chick.

METHODS

Male white Leghorn chickens were obtained at one day of age from the Kazmeier Hatchery (Bryan, Texas) and housed in temperature-controlled brooders, with food and water available ad libitum. A hot water extract of a commercial preparation of dried ground catnip (Meer Corp., North Bergen, N. J. Lot # 36-82220) was prepared by pouring boiling water (350 ml) over the catnip (50 g) and the mixture was periodically shaken and allowed to steep in a closed container overnight (approximately 18 hours). The mixture was filtered under vacuum and the residue was retained for further extraction. The solvent was evaporated using a Rotavapor. Weighed samples (400, 800, 1000 mg) of the solid residue, left after evaporation of the solvent, were added to distilled water and the volume adjusted to 10 ml. This allowed a dose level of 0.01 ml/g of body weight. All drugs were administered intraperitoneally. The control chicks received the same volume of distilled water. Groups of 12 chicks were injected at each dose level and immediately after injection, each chick was placed in a standard galvanized steel mouse cage, one animal per cage, and closely observed for 2 hours. Two different groups of chicks were injected at each dose level. One group, labeled young, was injected at an average age of 9 days (± 5 days), while the other group, labeled old, was injected at 25 days (±

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7 days) in order to evaluate the effect of age on the catnip response. The average latency to, the average episode duration, and average total duration (terms defined in footnote of Table 1) of four classes of behavior were noted: 1) light sleep (i.e. the chick sat or stood quietly, without peeping with eyes closed and head up); 2) deep sleep (the chick sat down without moving or peeping, with eyes closed and head down or lost posture and lay on side); 3) quiet wakefulness (the chick stood or sat quietly, without peeping, with eyes open and staring into space); and 4) normal wakefulness (the chick moved about and peeped). Since we lack the standard neurophysiological correlates of sleep, we are using these terms (i.e. light and deep sleep), for the convenience of discussion, to describe the overt behavior of the chick and not to define a specific physiological state.

All statistical evaluations utilized the Kruskal-Wallis one-way analysis of variance test and where appropriate, Nemenyi's procedure was used as the multiple comparisons test (Kirk, 1968). All comparisons were made at the 99.9% confidence interval unless specified otherwise.

RESULTS

When comparing the control and experimental chicks, there was a statistically significant increase in the number of episodes of light sleep in both the young and old chicks and this change was dose-dependent. With increasing doses of catnip in both the young and old chicks, the number of episodes tended to decrease but was still significantly higher than found in the control chicks. In the young chicks, the average episode duration and average total duration of light sleep was significantly increased when comparing control and experimental chicks. There was also a significant increase in the average episode duration and the average total duration of light sleep when comparing the groups that received 400 and 1000, 800 and 1000, but no significant change in groups that received 400 and 800. For the old chicks, there was a significant increase in the average episode duration and the average total duration of light sleep, when comparing the control chicks to the experimental chicks, but there was no significant change among the various experimental groups.

When comparing over age groups at each dose level, the younger chicks had significantly longer average episode durations and average total durations than the older chicks. The younger chicks also tended to have more episodes of light sleep than the older chicks.

DISCUSSION

By examining Table 1 and the results section, it is clear that "catnip tea" possesses significant biological and, potentially, psychotropic activity. We are currently trying to isolate the active component(s) and identify same.

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Table 1. The effect of weighed samples of the residue left after evaporation of the solvent of a hot water extract of dried ground catnip on light sleep. The first number in each pair is the average duration and the number immediately below it is its standard deviation. All times are expressed in seconds.

	Young Chicks (9 ± 5 Days)		Old Chicks (25 ± 7 Days)	
Mg/kg Catnip Extract	Average Episode Duration*	Average Total Duration**	Average Episode Duration*	Average Total Duration**
400	86.89 (26.07)	1249.25 (614.11)	20.80 (3.40)	171.67 (100.14)
800	72.30 (29.48)	1045.00 (890.51)	23.27 (18.50)	280.03 (302.64)
1000	1040.44 (727.95)	7975.33 (3370.60)	16.59 (13.63)	152.5 (230.42)

*Average Episode Duration = $\dfrac{\dfrac{N}{\Sigma 1}\ \dfrac{n}{\Sigma 1x}}{N}$

**Average Total Duration = $\dfrac{N}{\Sigma 1}\ \dfrac{n}{\Sigma 1x}$

where x is the individual duration of a behavior of a chick, n is the number of episodes of that behavior, and N is the number of chicks in an experimental or control group.

SUMMARY

Weighed samples (400, 800, 1000 mg/kg) of the residue from evaporation of solvent of a hot water extract of dried *Nepeta cataria*, caused a dose-dependent increase in the number, average episode duration, and average total duration of light sleep periods in chicks at two age levels (X = 9 and 25 days).

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