EFFECTS OF EXPOSURE TO SELECTED ESSENTIAL OILS ON THE BEHAVIOR OF DOMESTIC CATS – A PRELIMINARY STUDY

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Abstract

The aim of the study was to evaluate the responses of female domestic cats exhibiting signs of anxiety disorders to exposure to selected essential oils: true lavender (Lavandula angustifolia) and Roman chamomile (Chamaemelum nobile). A three-week pilot study was conducted involving 25 female domestic cats aged 2–7 years and kept in home environments. Aromatherapy sessions were carried out daily in the animals' homes, and the cats were free to choose whether to interact with the scents. Caregivers recorded the cats' responses and any behavioral changes in daily and weekly observation questionnaires. The chi-square test was used for data analysis. The study showed a significant effect of therapy duration on the cats' level of interest in the essential oils; interest was highest at the beginning of the experiment, then decreased, and increased again in the third week. No significant relationships were found between the duration of aromatherapy sessions and successive days of therapy. As the study progressed, scent preferences changed—from the selection of individual oils to more frequent inhalation of both aromas and a gradual individualization of preferences. The cats' behavioral responses were mainly exploratory and relaxation-related, and the absence of negative reactions indicated good tolerance of the aromatherapy used.

Keywords: essential oils, aromatherapy, anxiety disorders, cats

Introduction

Aromatherapy involves the therapeutic use of natural essential oils—mixtures of volatile organic compounds obtained from plant materials (Brud and Konopacka-Brud, 1998). These substances may be administered by inhalation (e.g. passive or active inhalation) or transdermally (e.g. massage, compresses, baths). The stated purpose of aromatherapy is to alleviate selected somatic and psychological symptoms and improve overall well-being. It should be noted, however, that the level of scientific evidence supporting the clinical efficacy of aromatherapy varies; the most consistent findings concern reductions in tension and anxiety, whereas evidence regarding analgesic or antimicrobial effects under clinical conditions remains limited (Perry and Perry, 2006; Lee et al., 2012).

The historical use of aromatic substances dates back to antiquity. The term "aromatherapy" itself was introduced by Gattefossé in the 1930s. The subject was later developed by Valnet, who described the potential antimicrobial and supportive properties of essential oils (Valnet, 1980). It should be emphasized, however, that a substantial proportion of the data on antibacterial and antifungal activity comes from in vitro studies, the results of which cannot be directly extrapolated to therapeutic efficacy in vivo (Perry and Perry, 2006).

Since the 1980s, aromatherapy has also been used in veterinary medicine. Ingraham contributed to the popularization of this approach by promoting the concept of zoopharmacognosy, i.e. the ability of animals to instinctively select substances that may potentially support homeostasis (Ingraham, 2011; Morag et al., 2020).

The hypothetical mechanism of aromatherapy is associated with the functional connection between the olfactory and limbic systems. Odor stimuli detected by receptors in the olfactory epithelium are transmitted to the olfactory bulb and then to subcortical structures, including the limbic system, which is responsible for regulating emotions and motivated behavior (Alberghina et al., 2022). Modulation of neurotransmitter activity, including serotonin and noradrenaline, may partly explain observed behavioral changes, although a direct translation of these processes into a clinical effect requires further controlled studies (Herz, 2009).

In cats, the safety of essential-oil use is of particular importance. This species has a limited ability to metabolize certain phenolic and terpenoid compounds because of reduced activity of selected isoforms of UDP-glucuronosyltransferase (UGT) enzymes responsible for glucuronidation (Court, 2013). Consequently, certain essential-oil constituents may accumulate in the body. Substances containing monoterpenes (e.g. pinene and limonene), found among others in citrus and pine oils, are considered potentially particularly hazardous. Signs of poisoning may include vomiting, hypersalivation, lethargy, impaired motor coordination and increased liver enzyme activity; in severe cases, liver failure may occur (Bell, 2002).

Substantial dilution is recommended (e.g. 1 drop of essential oil per 10–30 ml of carrier oil), together with allowing the animal to freely choose whether to contact the odor stimulus (Ingraham, 2011). Inhalation is regarded as a relatively safest form of exposure, whereas oral administration remains highly controversial and should be considered only under veterinary supervision (Court, 2013).

The aim of the study was to evaluate the responses of female domestic cats to selected essential oils. Both the animals' immediate (primary) response to the odor stimulus and their general behavioral attitude, as well as any behavioral changes observed after the aromatherapy intervention, were analyzed. The assessment was based on behavioral parameters commonly used in studies of stress and anxiety in animals, such as body posture, vocalization, locomotor activity and a tendency to avoid the stimulus (Ellis et al., 2013; Stella and Croney, 2016). Two essential oils described in the literature as having potential calming effects were used: true lavender oil (Lavandula angustifolia Mill.; syn. Lavandula officinalis) and Roman chamomile oil

(Chamaemelum nobile (L.) All.; syn. Anthemis nobilis). These substances were selected because of their chemical composition—in particular the presence of linalool and linalyl acetate in lavender oil and esters (including angelates) in chamomile oil—which have been attributed properties that modulate central nervous system activity and reduce tension (Cavanagh and Wilkinson, 2002; Perry and Perry, 2006).

Experimental reports indicate that inhalation of lavender oil may be associated with reduced signs of anxiety and arousal, although the mechanism of action has not been unequivocally explained and the findings require further verification (Herz, 2009; Lee et al., 2012). Lavender oil contains, among other constituents, linalool and linalyl acetate, compounds to which calming and anxiolytic effects have been attributed in experimental studies (Morag et al., 2020). It has also been described in the literature as a substance with potential anti-inflammatory and spasmolytic properties; however, evidence on clinical efficacy, especially in cats, remains limited (Morag, 2011).

Roman chamomile oil contains mainly esters (including angelates), to which calming and antispasmodic effects are attributed. In veterinary aromatherapy it is sometimes used as a supportive agent in states of excessive arousal and stress-related disorders; however, as with lavender, scientific evidence regarding its efficacy in cats is limited (Morag, 2011).

The aim of the study was to evaluate the responses of female domestic cats exhibiting signs of anxiety disorders to exposure to selected essential oils from true lavender (Lavandula angustifolia) and Roman chamomile (Chamaemelum nobile).

Material and methods

A three-week pilot study was conducted to evaluate the effects of exposure to selected essential oils on anxiety-related signs in female domestic cats (Felis catus). Female cats were recruited via social media. Announcements were posted on the website "Kocia behawiorystka dr Weronika Penar – Purr Science – naukowo o kotach" and in publicly accessible thematic groups devoted to cat care. Participation in the study was voluntary, and caregivers provided informed consent for their animals to take part.

To reduce inter-individual variability, the study included only spayed female non-pedigree cats (n = 25) aged 2–7 years, kept exclusively indoors. Additional inclusion criteria were the absence of diagnosed somatic diseases and no pharmacological treatment during the study period. Cats were eligible if all of the following signs had persisted for at least 16 weeks: social withdrawal and a tendency to remain hidden frequently, excessive vigilance, avoidance of human contact or contact with only one caregiver, reluctance toward novelty, signs of self-directed aggression (excessive licking, biting out fur, attacking the tail), and limited exploration of new environmental elements. A substantial proportion of the cats had been separated from their mothers before 8 weeks of age or the age at separation was unknown; this was recorded as a potential risk factor for the development of anxiety disorders.

The aromatic substances were selected following consultation with a certified phytotherapist and animal behaviorist. Two essential oils to which the literature attributes potential calming and stress-response-modulating properties were chosen: true lavender oil (Lavandula angustifolia Mill.; syn. Lavandula officinalis) and Roman chamomile oil (Chamaemelum nobile (L.) All.; syn. Anthemis nobilis).

The study used 100% essential oils supplied by Herbiness® (Inez Rogozińska, Poland). According to the manufacturer, the preparations were pure, undiluted and free of synthetic additives. Grapeseed oil (Basso Fedele e Figli S.r.l., Italy) was used as the carrier oil.

To minimize the risk of adverse effects, substantial dilution was used. One drop of essential oil (≈ 0.05 ml) was added to 10-ml dark-glass bottles, which were then filled to 10 ml with carrier oil, yielding an approximate concentration of 0.5% (about 1:200). The preparations were made

immediately before the start of the study and stored at room temperature (approx. 20–22°C) with limited exposure to light.
Each caregiver received a study kit containing:
– 10 ml of diluted true lavender oil (Lavandula angustifolia),
– 10 ml of diluted Roman chamomile oil (Chamaemelum nobile).
The kits were delivered in person or sent by courier. During transport, the bottles were protected with cushioning material to reduce the risk of mechanical damage and exposure to light.

Study procedure
The study was a pilot investigation and lasted 21 days. According to the experimental assumptions, this period was intended to allow the cats to adapt to the presence of new odor stimuli in the home environment and to enable observation of any behavioral changes associated with the aromatherapy intervention. Aromatherapy sessions took place in the caregivers' homes, allowing observations to be conducted in a natural environment familiar to the animals. This approach was intended to limit additional stressors that might occur under laboratory conditions (e.g. a change of surroundings or the presence of unfamiliar people).
Before the study began, caregivers received detailed procedural instructions by e-mail and in a video prepared by a certified phytotherapist and animal behaviorist. The instructions covered preparation of a suitable calm environment for the session, rules for safely offering the essential oils, and interpretation of possible animal responses (interest, indifference, avoidance).

Sessions were held daily at a fixed time selected individually by each caregiver, taking the animals' activity rhythms into account. During each session, two essential oils (lavender and chamomile) were offered to the cat in open bottles or on cosmetic cotton pads moistened with 1–2 drops of the preparation. The oils were placed at least 0.5 m apart to limit mixing of the scents and at a distance that allowed the animal to approach the chosen aroma freely or move away from it. No minimum exposure time was specified—the duration and intensity of contact with the scent were controlled by the animal.

A key premise of the study was voluntary participation by the animal in each session. The cats were not forced to contact the preparations, and access to the oils was based on free choice. After each session, caregivers completed a daily observation questionnaire recording: the cat's response to the scents (interest, indifference, avoidance), any scent preference (choice of a particular oil), the approximate duration of contact with the aroma, and behavioral changes observed after the session. In addition, after each week of therapy, caregivers completed a summary questionnaire concerning changes in the level of fearfulness and other behavioral modifications that might indicate an effect of the intervention. Assessment of anxiety level was subjective and based on caregiver reports. Because of the large amount of research material collected during the 21-day experiment, four time points (days 1, 7, 14 and 21) were selected for detailed analysis and considered representative for assessing changes in the level of interest in essential oils among cats exhibiting anxiety disorders.

Because of the nature of the data and the predominance of qualitative variables, the chi-square test of independence (χ^2) was used to analyze the results according to the following formula (Snedecor and Cochran, 1989):

$$\chi^2 = \sum \frac{(f - F)^2}{F}$$

where: f – number of observations in a group, F – expected group frequency.

The test was used to determine: the cats' preferences for the two types of essential oil, the duration of therapeutic sessions, and the effect of aromatherapy on anxiety level and general behavior. Because the chi-square test requires an expected frequency of at least 5 in each cate-

gory, for questions in which the number of responses in individual categories was lower, adjacent response categories were logically combined. To assess the effect of therapy week on oil choice, the "lavender" and "chamomile" categories were combined into one category termed "lavender or chamomile", and weeks 2 and 3 were combined. To examine the effect of therapeutic session duration, session-length categories were combined into two groups: "up to 10 minutes" and "more than 10 minutes". Days 14 and 21 of therapy were also combined into a single category. These steps were taken to satisfy the test assumptions and preserve the statistical power of the analysis. Chi-square values were calculated using SAS (2014). The significance level was set at $\alpha = 0.05$.

Results

In the analysis of scent preferences, an active behavioral response to either of the two essential oils presented (true lavender or Roman chamomile) was assessed on individual observation days. On day 1 of the experiment, the highest level of interest in the scents was recorded: 80% of the animals (n = 20) responded to at least one oil, while no response was observed in 20% (n = 5). On day 7, a slight decline in interest was noted. Active interaction with the essential oils was shown by 72% of the cats (n = 18), whereas 28% (n = 7) did not respond to the odor stimuli presented. The lowest level of interest was recorded on day 14, when only 32% of the animals (n = 8) responded to the aromas and 68% (n = 17) remained indifferent to the scents offered. On day 21, interest in the essential oils increased again: 48% of the cats (n = 12) responded to the scents, while 52% (n = 13) showed no interest in the aromas presented (Fig. 1).

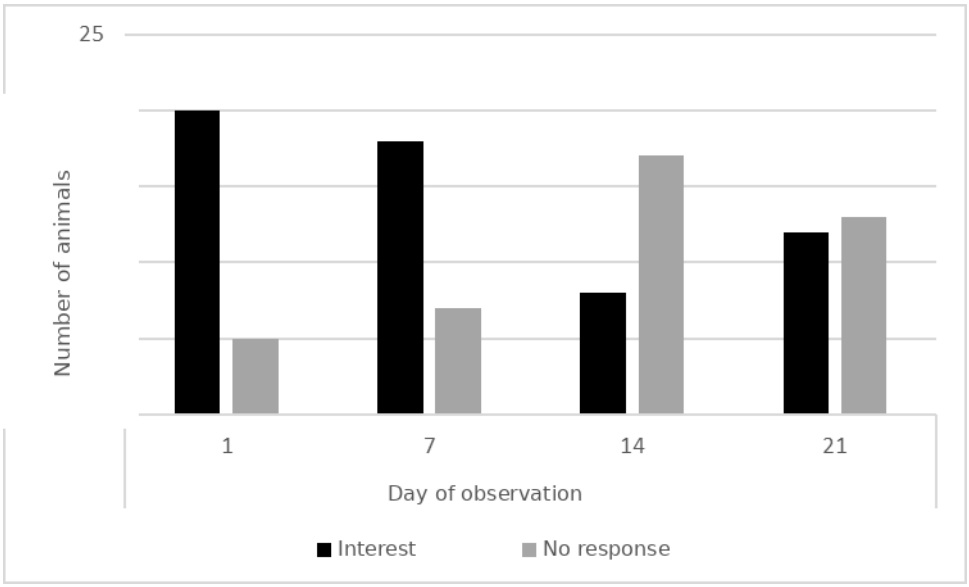

Fig. 1. Interest of female cats in essential oils on successive observation days

Table 1 presents the relationship between the number of responses to the question concerning the cats' interest in the oils on successive study days, together with the χ^2 test statistic and its significance (P-value).

Table 1. Relationship between the number of responses concerning female cats' interest in essential oils on successive study days

Response	Day of the study				χ^2	P-value
	1	7	14	21		
Interest	20	18	8	12	14,94	0,0019
No response	5	7	17	13		

Analysis of Table 1 shows that the effect of study day on the cats' interest in the tested oils was highly significant ($\chi^2 = 14.94$; $P = 0.0019$). The greatest interest in the oils was observed on the first day of the study. On subsequent days, interest declined slightly, as indicated by the decreasing number of "interest" responses on days 7 and 14. Only in the final week of the study (day 21) did the cats again begin to show somewhat greater interest in the oils.

On day 1 of the experiment (n = 20), inhalations lasting less than 3 minutes were most frequent—35% of cases (n = 7). Sessions lasting 3–5 minutes and 10–15 minutes occurred with similar frequency—20% each (n = 4). Inhalations lasting 15–20 minutes and more than 20 minutes were less frequent—10% each (n = 2), whereas the 5–10-minute category was least common (5%; n = 1). On day 7, 18 cats showed interest. Short sessions were most common: less than 3 minutes and 3–5 minutes (28% each; n = 5). Inhalations lasting 5–10 minutes and 15–20 minutes each accounted for 11% of cases (n = 2), while a 10–15-minute session was recorded in one cat (6%). The number of the longest sessions (>20 minutes) also increased to 17% (n = 3). On day 14 (n = 8), when interest was lowest, 5–10-minute inhalations predominated—63% (n = 5). The remaining intervals (<3 min, 3–5 min, 10–15 min) were recorded only in single animals (12% each; n = 1), and no sessions lasting >15 minutes occurred. On day 21 (n = 12), the distribution of session lengths was more varied. The most common inhalations lasted 5–10 minutes (33%; n = 4) and 10–15 minutes (25%; n = 3). Sessions lasting 3–5 minutes and 15–20 minutes each accounted for 17% (n = 2), while one cat had a session lasting <3 minutes (8%). No inhalations longer than 20 minutes were observed on that day (Fig. 2).

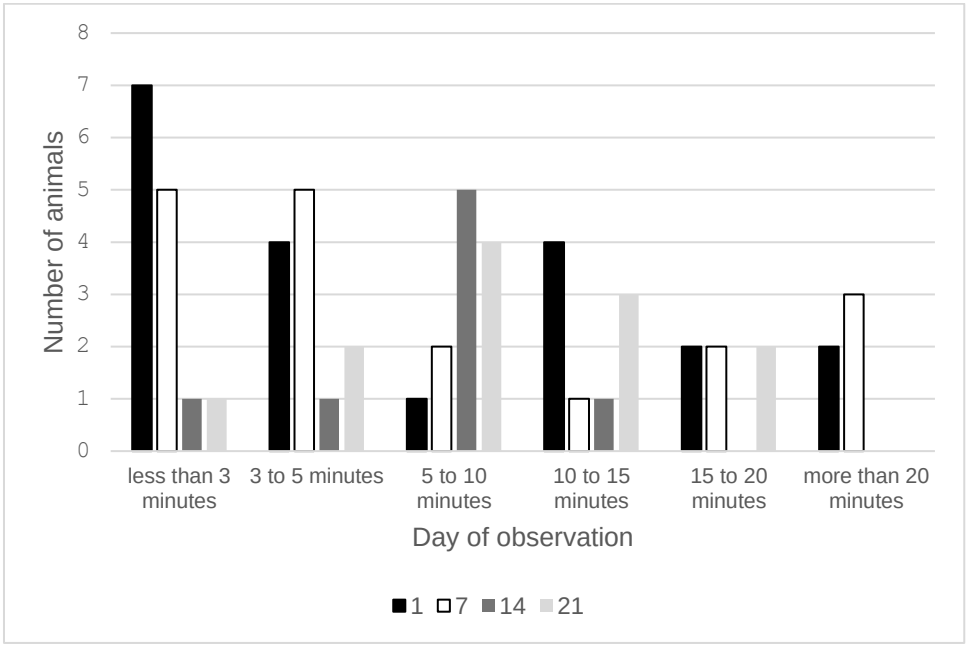

Fig. 2. Duration of inhalation on successive observation days

Despite the variability in therapeutic session length observed in the study, no statistically significant relationship was found between inhalation duration and successive days of therapy ($\chi^2 = 3.74$; $P = 0.1541$). Likewise, no significant relationship was found between inhalation duration and study week ($\chi^2 = 0.05$; $P = 0.8253$).

On day 1 of the experiment (n = 20), which was characterized by the highest level of interest, preferences for the offered oils were most diverse. Of the animals studied, 45% (n = 9) showed a clear preference for Roman chamomile oil, 35% (n = 7) preferred true lavender oil, and 20% (n = 4) were interested in both formulations simultaneously. On day 7 (n = 18), the largest group of cats (45%; n = 8) preferred both oils at the same time, representing an increase compared with day 1. At the same time, the number of individuals preferring only one oil decreased: interest in chamomile oil fell by five cats, and interest in lavender oil by one cat. On day 14, when the overall level of interest in aromatherapy was lowest (n = 8), as many as 75% of the cats (n = 6) preferred both scent formulations, the highest proportion in the entire study. The remaining two cats each preferred a single oil—one lavender and one chamomile. On day 21, the number of cats interested in aromatherapy increased to 12. Half of them (50%; n = 6) preferred both oils simultaneously, while the remaining animals were evenly divided between lavender and chamomile oil—three cats in each category (25% each). These results indicate that during the initial stage of the study the cats' preferences were more dispersed, with single-oil choices predominating, particularly Roman chamomile (45%). On subsequent days, interest in simultaneous inhalation of both oils increased; on days 7 and 14, 45–75% of interested individuals preferred both scents. On the final day, the proportion choosing both formulations remained at 50%, while selectivity for a single oil increased: compared with day 14, the proportion choosing lavender oil alone increased by 13 percentage points and the proportion choosing chamomile oil alone by 12 percentage points. This trend may indicate increasing individualization of scent preferences and a more selective choice of a specific oil, potentially related to its particular therapeutic properties (Fig. 3).

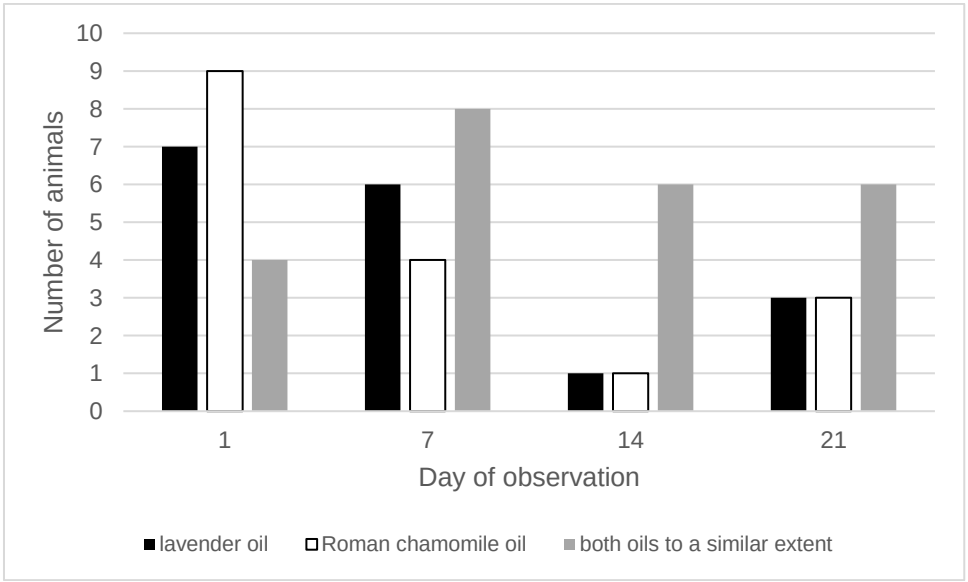

Fig. 3. Preferences of female cats for essential oils on successive observation days

The effect of therapy day on the cats' oil preferences was also analyzed, and highly significant differences in oil choice were found over the course of therapy ($\chi^2 = 20.89$; $P = 0.0003$). A significant relationship was also found between therapy week and the animals' choice of oils ($\chi^2 = 7.21$; $P = 0.0272$). At the beginning of the study, the cats tended to choose one specific oil. In subsequent weeks, however, they more often chose both oils or discontinued

inhalation altogether. This may indicate reduced sensory demand or adaptation of the cats' olfactory system to these odor stimuli.

Only animals that showed interest in the essential oils on a given study day were included in further analysis. The observation forms used multiple-choice questions that allowed several co-occurring behavioral responses to be recorded and grouped into four categories: intensity of inhalation (sniffing, nose licking, lying with the nose directed toward the odor source, yawning, lip smacking, deep sighs), relaxing effects of the oils (slight eye narrowing, yawning, drowsiness, falling asleep), vocalizations (meowing/soft meowing, purring, hissing), and additional responses (scratching/biting the body, desire for physical interaction with the bottle). On day 1 (n = 20), sniffing was the most common response (27% of all responses), followed by slight eye narrowing (13%), interaction with the bottle (12%), and nose licking (9%). Other responses, including yawning, lip smacking and deep sighs, were less frequent (3–8% each). Meowing/soft meowing was recorded in one cat (1%), while hissing and falling asleep were not observed. On day 7 (n = 18), sniffing predominated (33%), while secondary responses included slight eye narrowing (15%) and an attempt to interact with the bottle (10%). Yawning, deep sighs and nose licking each occurred in 6%, and lip smacking and nose moistening in 4% each. Scratching, body biting and falling asleep were recorded in individual cats (2%). Hissing and purring did not occur. On day 14 (n = 8), sniffing and slight eye narrowing were most frequent (16% each). Secondary responses included yawning (13%), deep sighs (10%) and an attempt to interact with the bottle (9%). Nose licking and falling asleep were rare (6% each), while the remaining responses—purring, lip smacking, meowing, lying with the nose directed toward the bottle, and scratching—each accounted for 3%. Hissing and nose moistening did not occur. On day 21 (n = 12), sniffing and slight eye narrowing were again the most common responses (17% each). Secondary responses were yawning, lip smacking and nose licking (11% each), with occasional nose moistening (7%) and interaction with the bottle or lying with the nose toward the aroma source (6% each). Meowing/soft meowing was observed in one cat (2%), while hissing, drowsiness and scratching/body biting did not occur. Across the study, sniffing and slight eye narrowing remained the most frequent responses, suggesting a stable level of interest and a mild relaxing effect of the oils. Greater behavioral activity, including vocalizations and physical exploration of the bottle, was observed during the initial phase, whereas relaxation-related signs such as yawning and eye narrowing predominated as therapy progressed. The absence of negative responses (hissing, escape, piloerection) indicates appropriate selection and dilution of the oils and voluntary contact of the cats with the odor stimulus (Fig. 4).

However, no significant relationship was found between successive weeks of therapy and a positive effect on the cat ($\chi^2 = 2.33$; $P = 0.3114$). Likewise, no significant relationship was found between therapy week and anxiety reduction understood as a positive behavioral change in the cats ($\chi^2 = 4.16$; $P = 0.1249$).

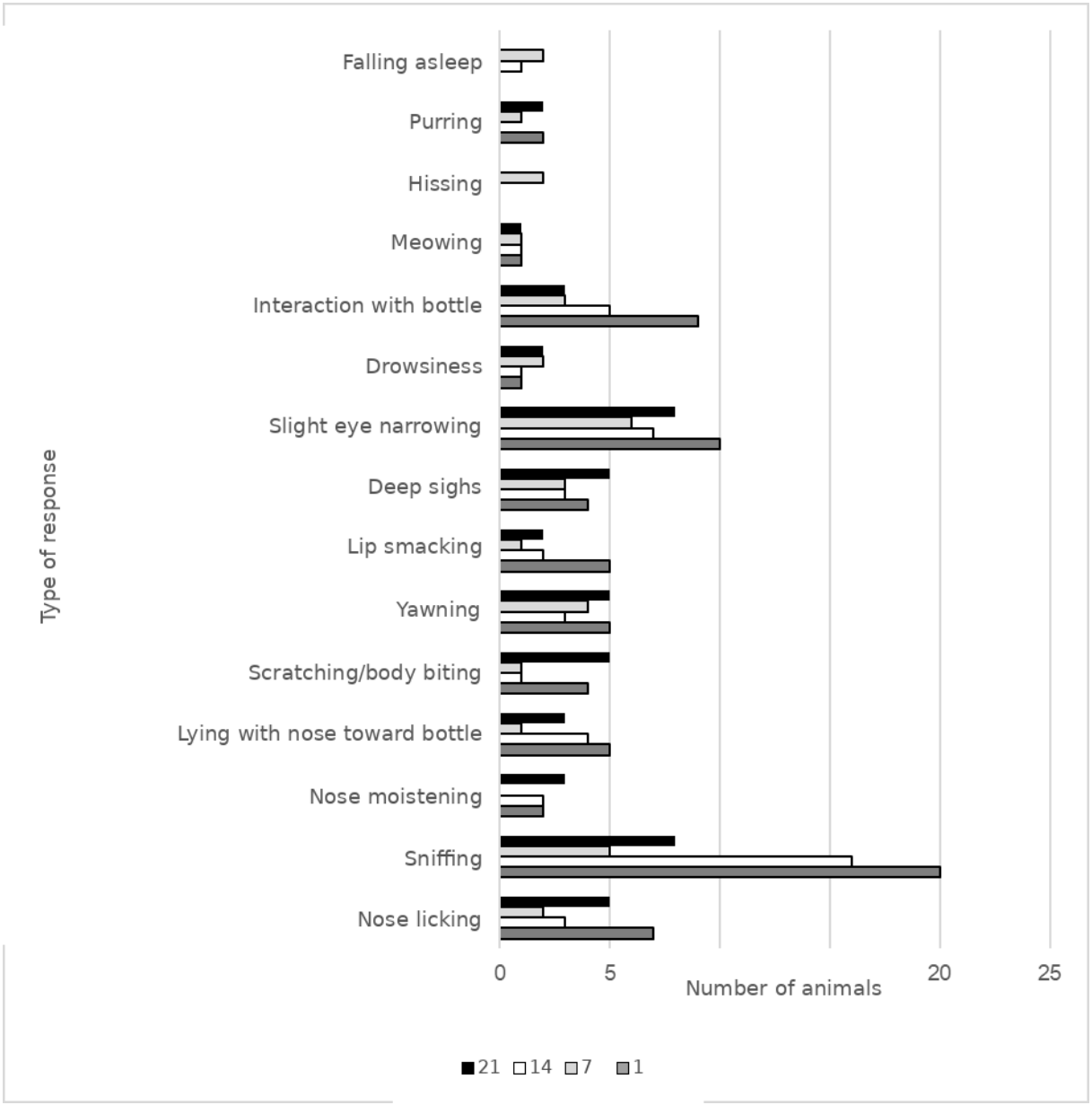

Fig. 4. Behavioral responses to aromatherapy on successive observation days

Discussion

The results of this study indicate that the cats' interest in the essential oils offered changed markedly over the course of the three-week aromatherapy intervention. The greatest interest in the aromas was recorded on the first day of the experiment, which may be interpreted as a natural exploratory response to a novel odor stimulus appearing in the animal's environment. Cats, as a species with a highly developed sense of smell and high sensitivity to environmental changes, tend to investigate new sensory stimuli intensively before engaging in prolonged interaction with a given environmental element. The predominance of short aromatherapy sessions in the initial phase of the study may therefore reflect a stage of preliminary exploration and assessment of the properties of the offered aromatic substances.

On subsequent days of therapy, a gradual reduction in the number of interactions with the aromas was observed, while the duration of individual sessions increased in some animals.

This may suggest adaptation to the presence of odor stimuli in the environment and more selective use of the aromas offered. It should be emphasized, however, that increased interest in a scent is not necessarily synonymous with therapeutic efficacy. The frequency and duration of contact with an aroma primarily reflect the attractiveness or acceptance of a given odor stimulus, whereas a therapeutic effect would require confirmation using additional behavioral or physiological indicators.

During the second week of the experiment, interest in essential oils reached its lowest level, which may have been related both to habituation to the presence of the scent and to a temporary lack of need to use the odor stimulus as a potential regulator of emotional state. It is worth noting, however, that cats that continued to interact with the aromas during this period spent relatively more time near them than during the initial phase of the study, which may suggest more targeted use of the properties of the substances offered.

The renewed increase in interest in essential oils during the third week of the experiment may indicate the reappearance of environmental stressors or a change in the cats' emotional state. At the same time, the mean duration of aromatherapy sessions was longer during this period than at the beginning of the study, which may indicate greater engagement by the animals and improved recognition of the aromas offered. This phenomenon may be interpreted as a potential effect of learning and remembering the properties of scents that may previously have been associated with a particular emotional or physiological state. It does not, however, automatically imply a therapeutic effect, but rather a change in the way the animals interacted with the odor stimuli offered.

The observed changes in interest in the aromas are consistent with the concept presented by Morag (2011), according to which animals may show variable scent preferences depending on their current physiological and emotional needs. The concept of zoopharmacognosy assumes that animals have the ability to spontaneously select plant substances or their extracts that may support regulatory processes in the body. During the initial phase of contact with aromas, animals often show interest in one dominant scent, whereas only at a later stage may they broaden the range of odor stimuli they explore.

A similar phenomenon was described in the case study reported by Valente and Kleefeld (2025), in which a cat showing signs of emotional distress and a depression-like state spontaneously selected different essential oils and absolutes at successive stages of recovery. Initially, a preference was observed for bitter orange oil (Citrus aurantium) and yarrow (Achillea millefolium), whereas later the animal selected jasmine (Jasminum grandiflorum) and linden (Tilia cordata). The authors suggested that this variability may reflect an animal's ability to modulate contact with odor stimuli according to its current emotional state and physiological needs. The results of the present study partly support this interpretation, indicating the dynamic nature of the cats' interactions with the aromas offered.

In the context of the present study, statistical analysis did not demonstrate a significant effect of therapy duration or the length of individual aromatherapy sessions on the overall therapeutic outcome. This may reflect substantial individual variation in behavioral responses among cats and differences in the rate of adaptation to new environmental stimuli. Studies of feline behavior have repeatedly emphasized that behavioral responses in this species are strongly modulated by individual factors such as previous experience, degree of socialization and the current structure of the environment (Ellis et al., 2013).

The results of the present study are also partly consistent with observations from research conducted at Lahore Zoo, where five species of solitary carnivores, including felids, were offered five different essential oils, including lavender oil (Ahsan et al., 2024). That study showed that exposure to aromas may reduce stress indicators at both the behavioral and physiological levels, as confirmed by measurements of cortisol concentration. At the same time, the

authors emphasized that the observed effect was temporary—approximately ten days after exposure ended, cortisol levels returned to baseline. These findings suggest that aromatherapy may support short-term stress regulation, but its effects are not persistent when environmental stressors remain present.

An important aspect of the present study was the voluntary nature of the cats' contact with odor stimuli. The cats were able to decide independently on the duration and intensity of their interaction with the aromas, which may have helped limit additional stress associated with an imposed sensory stimulus. The literature emphasizes that retaining control over the environment is one of the key elements of animal welfare (Stella and Croney, 2016). In contrast to methods involving forced exposure to odors, an approach based on voluntary scent choice may increase an animal's motivation to interact with the stimulus and reduce the risk of aversive responses.

Studies by Goodwin and Reynolds (2018) and Uccheddu et al. (2018) showed that aromatherapy may reduce stress indicators in companion animals; however, in many cases the procedures involved forced exposure to odors, for example by diffusing an aroma throughout a room. Although this approach may produce positive behavioral effects, it also restricts the animal's ability to choose the stimulus and, in some cases, may increase stress or lead to avoidance of the space in which the odor is present.

In the present study, aromatherapy did not produce noticeable effects in all cats. Possible reasons include a mismatch between the aroma offered and the individual animal's preferences, the presence of additional environmental stressors such as other cats in the household, variability in daily environmental stimuli, and failure to eliminate the primary causes of anxiety. The literature emphasizes that the effectiveness of behavioral interventions in cats depends to a large extent on a comprehensive approach involving both environmental modification and identification of the underlying sources of stress (Ellis et al., 2013).

The study demonstrated a significant effect of therapy duration on the cats' level of interest in essential oils, which was highest at the beginning of the experiment, then decreased, and increased again in the third week. At the same time, no significant relationships were found between the duration of aromatherapy sessions and successive days of therapy. As the study progressed, scent preferences changed—from choosing individual oils to more frequent inhalation of both aromas and gradual individualization of preferences. The cats' behavioral responses were mainly exploratory and relaxation-related. No clear aversive responses to the aromas used were observed; however, in a free-choice methodology, lack of contact with a particular scent may also represent avoidance. Therefore, the absence of negative reactions should not be interpreted unequivocally as evidence of good tolerance or beneficial effects of the essential oils. Despite the observed behavioral changes, no significant effect of therapy on reducing anxiety-related signs was demonstrated, highlighting the need for further research.

This study was a pilot investigation and involved important methodological limitations. The most important were the relatively small sample size, absence of a control group, subjective assessment of animal behavior, and lack of objective physiological measurements such as cortisol determination or analysis of activity parameters. In addition, the study included only female non-pedigree cats kept in home environments, which limits the generalizability of the findings to cat populations with different environmental or genetic backgrounds.

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EFFECTS OF EXPOSURE TO SELECTED ESSENTIAL OILS ON THE BEHAVIOR OF DOMESTIC CATS: A PRELIMINARY STUDY

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SUMMARY

The aim of the study was to evaluate the responses of cats exhibiting anxiety-related behaviors to exposure to selected essential oils: lavender (*Lavandula angustifolia*) and Roman chamomile (*Chamaemelum nobile*). A three-week pilot study was conducted on 25 female domestic cats aged 2–7 years, kept under home conditions. Aromatherapy sessions were carried out daily in the animals' home environment, and the cats were allowed to freely choose whether to interact with the scents. Caregivers recorded the animals' responses and any behavioral changes using daily and weekly observational questionnaires. Data were analyzed using the chi-square test. The study demonstrated a significant effect of therapy duration on the level of interest in essential oils, which was highest at the beginning of the experiment, then decreased, and increased again in the third week. No significant relationships were found between session duration and subsequent days of therapy. Over time, changes in olfactory preferences were observed, shifting from the selection of single oils to more frequent inhalation of both aromas and increasing individualization of preferences. Behavioral responses were predominantly exploratory and relaxation-related, and the absence of negative reactions indicates good tolerance of the applied aromatherapy.

Keywords: essential oils, aromatherapy, anxiety disorders, cats