



INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES



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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v12-i10/15061> DOI:10.6007/IJARBSS/v12-i10/15061

Received: 14 August 2022, **Revised:** 15 September 2022, **Accepted:** 29 September 2022

Published Online: 17 October 2022

In-Text Citation: (Jiek et al., 2022)

To Cite this Article: Jiek, G. M., Anuar, N., Sukareski, H., & Panadi, M. (2022). Effects of Lavender Aromatherapy on Stress Horses. *International Journal of Academic Research in Business and Social Sciences*, 12(10), 3194– 3200.

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Vol. 12, No. 10, 2022, Pg. 3194 – 3200

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www.hrmar.com

ISSN: 2222-6990

Effects of Lavender Aromatherapy on Stress Horses

G. Mei Jiek¹, Nurwina Anuar², Hazar Sukareski¹, Mira Panadi¹

¹Department of Clinical Sciences and Health Technology, School of Biomedical Engineering and Health Sciences, University Technology Malaysia, 81310 Skudai, Johor Bahru, Johor, Malaysia, ²Faculty of Education, Universiti Kebangsaan Malaysia, Bandar Baru Bangi, 43650 Selangor.

Email: nurwina@ukm.edu.my

Abstract

The heart rate and respiratory rates of competition horses and stabled horses may increase due to environmental stressors. Aromatherapy has been legalized and revealed to be very helpful to horses that have been exposed to environmental stressors. This study aimed to investigate the effectiveness of lavender aromatherapy on horse heart rate and respiratory rate after being exposed to a stressor. A total of eight horses were observed as subjects in both water control and lavender aromatherapy. Lavender aromatherapy was diffused using an aroma diffuser with 3 drops of lavender essential oil along with 250ml of water for 30 minutes as well as water control. The paired sample t-test was applied to analyse. There is no significant effect of aromatherapy on the heart rate and respiratory rate of horses. In both water control group and lavender aromatherapy group, there were no significant changes of heart rate from stressed phase to recovery phase. Same goes for respiratory rate in water control group and lavender aromatherapy group from stressed phase to recovery phase. It can be concluded that lavender aromatherapy does not show any effective on horse heart rate and respiratory rate.

Keywords: Aromatherapy, Heart Rate, Horse, Lavender Aromatherapy, Respiratory Rate

Introduction

Animal such as horses are unlike any other animals. They are found to be beauty and attractive. They are label as charming animal as they are graceful and have high athletic skills. Horses are used in studies as there are growth in development, history, movement, anatomy and physiology. Especially due to their unique relationship and bonding with human. Their interaction with humans have bring many benefits starting from ancient time until nowadays. They are seen as a draft animal, transportation, helped in wars and as a companion with human (Evans, et al., 2020).

In 2015, Lobell and Powell has found the evidence of the encounters among horses and humans which is found at Paleolithic sites in Eurasia. It is revealed to be the earliest evidence

found by Lobell and Powell. It is known that the domestication has occurred 5500 to 7500 years ago (Fages et al., 2019; Librado et al., 2016).

In 2019, Fages et al. and Kelekna in 2009 had proven that domestication of horses had bring a broad impact to the socio-political and economic paths in human societies. For instance, horse has always been a source of food such as meat and milk. As it is mentioned above, horses are used as transportation as well. In this way, the speed and scale of the flow of goods and human has changed. In the past, having horses as transportation, the societies communications has fasten as well as in agriculture.

In 2014, Monika has stated that in the past decades, incredible development has cause a remarkable rising numbers in horse production and transformation of their living surroundings condition. However, these changes may affect the horse's wellbeing and mechanisms of their ability to adapt to human-made environment. Adaptation is revealed to be the use of regulatory systems in horses to help them cope with their environmental and surroundings conditions.

In 2007, Waran stated there is huge deviation from the horse's behavioural pattern comparing between wild horse and domesticated horse. It is stated that stereotypic behaviours are particularly associated with stabling. For example, weaving, crib-biting and box walking (Nicol, 1999). These are also known as abnormal behaviour. It is rarely to be seen in wild free ranging horses. It is said to be difficult to describe in functional terms, unwanted to horse owners and managers. This is because these can lead to or cause by welfare problems for stabled horse (Cooper & Mason, 1998).

In the previous studies, it is revealed that the horse living condition can be a factor to determine level of stress and environmental stressors (Cooper et al., 2000). In 2007, Mason et al. has shown that having bad weather, confinement, fear and being isolated has been considered environmental stressors for horses. In 2000, Cooper and co-workers shows that stereotypic behaviours will be lessen when horses are kept in stables with visual horizons. This indicates that horses need proper living conditions to minimize their stress.

Stress is a response of a living being to environmental stimuli which is a stressor that would threaten their internal equilibrium. These stimuli has been observed and evaluated by a cognitive system. It is revealed that these stimuli may cause many changes in horse behaviours (Ramos and Mormede, 1997). Horses tend to cope with their environment using behavioural and physiological stress responses. Which can be measured through the parameter. For instance, horses changes of heart rate, body temperature and the frequency of behavioural responses (Blokhuys et al., 1998).

Horse behavioural and physiological changes may happen in response to a sudden challenge and a long term problem such as in daily life (Daniel et al., 1999). It is indicated that domesticated horses tend to exposed towards many types of stressors. For example, new environments, athletic loads and travel (Ferguson et al., 2012). In 2018, Heitman et al. has also stated that competition horses are usually seen to endure many stressors. Which includes adapting new environments, high athletic loads, travelling and limited access to turn out. It is mentioned as well that if a horse is unable to adapt to high stress levels or a greater stress at international competitions, limited legal medications are available to tend the horses. It is found to be based on controlled and forbidden medication list from the Federation Equestre Internationale. Therefore, one of the medications is lavender aromatherapy. According to the Federation, It is not illegal when a horse inhaled lavender aroma through the air.

It is revealed that aromatherapy is seen to be very helpful to horses. This is because horses have a strong sense of smell. They are also most likely to expose to environmental

stressors (Baldwin et.al., 2018). In 2013, Ferguson et.al demonstrated that lavender aromatherapy does not bring effect to the respiratory rate but does bring effect to horse heart rate statistically significant after exposed to the stressor. However there is limited study on the effect of lavender aromatherapy on horses.

Therefore, in this study, lavender aromatherapy will be tested on horses to examine the effectiveness on the horse heart rate and respiratory rate. The experiment will be comparing the effectiveness between control treatment which will use distilled water and lavender aromatherapy. The horse will be tested after exposing them to the air horn as a stressor. The heart rate and respiratory rate will be taken as data collection before experiment, after exposing to the air horn and after the treatment to compare the effectiveness.

Objectives

1. To investigate the effectiveness of lavender aromatherapy on horses heart rate after exposing the horse to the air horn.
2. To investigate the effectiveness of lavender aromatherapy on horses respiratory rate after exposing the horse to the air horn.

Materials and Methods

Upon receiving the consent to run the experiment, 2 stables were approached. Four horses were from Stable A in Ayer Molek, Malacca and four other horses were from Stable B University Technology Malaysia. Therefore, a total of eight horses which was mares and geldings were used as subject in this experiment. The range of age of the horses are 14 to 22 years old. The horse's breeds were Criollo, Thoroughbred and Arab. During the experiment, the subjects were assigned randomly for the experiment order. It was a crossover design experiment as the horses received both water control (distilled water) and lavender treatment (doTERRA essential oil). Data collection took place in 4 weeks period. Before the experiment starts, an appropriate area for the aromatherapy were chosen and the air was humidified with treatment using Muji Air Humidifier Aroma Diffuser for 30 minutes. 3 drops of lavender essential oil were dripped into the diffuser that contained 250ml of water as lavender aromatherapy. 250ml of water only with no other substance were used as water control. Before the humidifying session ends, the subjects resting heart rate data were taken as baseline data using Polar Equine Healthcheck FT1 93045117 Horse Heart Rate Monitor. Meanwhile the resting respiratory rate data were collected using FriCARE stethoscope for 1 minute reading. Both reading were taken while the subject were in a stall. After the baseline data recorded, an air horn (Trident Sport Air Horn) were blown 2 times in a 15 seconds time as stressor outside the stall. After 15 seconds, heart rate and respiratory rate were recorded again. The subject were given 60 seconds to calm down. After the stressed phase data recorded, the subject were led to the humidified area and received the treatment for 15 minutes. Heart rate and respiratory rate were recorded again as recovery phase data. Procedure were used similarly for both water control and lavender treatment. Therefore, resting, stressed and recovery phase data of heart rate (HR) and respiratory rate (RR) were collected after the experiment fully conducted. Data analysis were performed in Microsoft word Excel which was paired T-test. Horse heart and Respiratory rate were recorded in sampling data sheet. The significant value was $P < 0.05$.

Results

In Table 1, the results showed that there were no statistical difference in rest phase heart rate between water control group (45.38 ± 1.36 bpm) and lavender aromatherapy group (44.13 ± 3.34 bpm). In stressed phase, the horse heart rate showed no statistical difference as well for both water control group (50.88 ± 4.68 bpm) and lavender aromatherapy group (45.5 ± 4.61 bpm). In addition, there were no changes in heart rate from stressed phase to recovery phase in water control group (50.88 ± 4.68 bpm to 45.13 ± 2.91 bpm, $P=0.15$), the value is not significant ($P>0.05$). Moreover, the heart rate from stressed phase to recovery phase in lavender aromatherapy group also has no significant changes (45.5 ± 4.61 bpm to 45.13 ± 2.64 bpm, $P=0.47$, $P>0.05$).

Table 2 reveals the result showed that the respiratory rate in rest phase and stressed phase has no statistical difference in both water control group (37 ± 4.19 brpm, 38.5 ± 4.78 brpm) and lavender aromatherapy group (34 ± 4.66 brpm, 40.5 ± 4.69 brpm). Moreover, the respiratory rate from stressed phase to recovery phase showed no changes in water control group (38.5 ± 4.78 brpm to 37 ± 5.11 brpm, $P=0.14$) and lavender aromatherapy group (40.5 ± 4.69 brpm to 39.5 ± 5.26 brpm, $P=0.42$). The value is not significant ($P>0.05$).

Table 1

Heart rate (bpm) of horses in different phases (Mean \pm SE). The p-value ($p<0.05$) indicated that the data differed significantly

| Phases | Water Control | Lavender Aromatherapy |
|-----------------------------|------------------|-----------------------|
| Rest | 45.38 ± 1.36 | 44.13 ± 3.34 |
| Stressed | 50.88 ± 4.68 | 45.5 ± 4.61 |
| Recovery | 45.13 ± 2.91 | 45.13 ± 2.64 |
| p-value (Recovery-stressed) | 0.15 | 0.47 |

Table 2

Respiratory rate (brpm) of horses in different phases (Mean \pm SE). The p-value ($p<0.05$) indicated that the data differed significantly

| Phases | Water Control | Lavender Aromatherapy |
|-----------------------------|-----------------|-----------------------|
| Rest | 37 ± 4.19 | 34 ± 4.66 |
| Stressed | 38.5 ± 4.78 | 40.5 ± 4.69 |
| Recovery | 37 ± 5.11 | 39.5 ± 5.26 |
| p-value (Recovery-stressed) | 0.14 | 0.42 |

Discussion

The study results showed that lavender aromatherapy is not effective in reducing horse heart rate and respiratory rate. The finding of this study was supported by a study done by Ferguson et al (2012) who found that lavender aromatherapy is not effective in decreasing the respiratory rate in horses. However, unlike the previous studies, horse heart rate was shown unable to decrease after receiving the treatment in this study. Some horse heart rate and respiratory rate did not elevated well in stressed phase during data collection as they may have been used to the stressor that was applied. It was likely due to the stables surroundings and activities at the experimental location. The stables was located and designed beside the vehicle roads, the horses were used to the car horn noises and loud noises which was similar to the air horn that was used in this study experiment. This causes the horses to have not much of reactions or fear to the sound of the air horn and got used to it.

This is why aromatherapy with essential oils can be seen used on uncooperative horses or horse with fear when working. These type of horses tend to cause accidents during riding or threats towards farriers and veterinarians. Horses that live through fear may have face a negative impact in their welfare, reproduction or even their performance in sports. Thus the essential oils that was chosen for aromatherapy has the calming effects which is in order to bring the horse to be calmer (Kosiara, et. al., 2021).

When a healthy horse is in a calm state, their heart rate would be 28 to 40 beats per minute (bpm) while their respiratory rate would be 10 to 14 breathe per minute (brpm). It is expected to see the parameter to rise during the stressed phase and reduce after receiving the lavender aromatherapy treatment. There were several studies that proved lavender aromatherapy were able to lower heart rate of horse. The average stressed heart rate were shown significantly higher than average recovery heart rate indicates that lavender aromatherapy does have effect in lowering horse heart rate (Heitman et al., 2018).

There was also a study proved that lavender aromatherapy revealed significantly decrease horse heart rate from stressed to recovery phase. However, it does not have effect in lowering respiratory rate of horse after receiving the treatment (Ferguson et al., 2012). Several essential oils were also tested in aromatherapy and found to be able to significantly decrease horse heart rate, respiratory tidal volume and ease horse facial relaxation in domesticated horses. It was stated by the authors that each essential oils bring out the effectiveness towards each parameters differently. Therefore, further studies was encourage in order to have more findings in aromatherapy (Kosiara et. al., 2021).

Conclusion

In conclusion, the effect of lavender aromatherapy on horses is not significant in this study. However, the researchers must not be overlooked previous studies that has proved the positive effect from the treatment on horses. Therefore, future researchers are advised to conduct more experiment related to aromatherapy on horses with proper procedures. Moreover, aromatherapy should be considered using only in short period time, as long term of using aromatherapy would cause less effectiveness.

Theoretical and Contextual Contribution

This study reveal the calming effects of lavender aromatherapy on horses who were exposed to stressor. However, this experiment showed that lavender aromatherapy bring slight positive effect in calming the horse and reduce heart rate and respiratory rate compare to the control therapy which bring significant effect. This shows that the experiment results are dissimilar to any other experiment conducted that is related to the aromatherapy. Control treatment in this experiment showed more effectiveness in calming horses. Therefore, control treatment can be take in consideration when conducting a related experiment in the future

Acknowledgements

We would like to thank Equine Park, Universiti Teknologi Malaysia and Stable in Ayer Molek for providing experimental horses and also Universiti Teknologi Malaysia for providing research facilities.

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