Thyme oil and argan oil's effects on horse welfare

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ABSTRACT

This study investigates both the effectiveness of thyme oil and argan oil as potential treatments for leg edema in horses, as well as their possible side effects, such as rash, itchiness, and increased temperature, to provide a comprehensive evaluation of their therapeutic potential and safety. Swollen legs, which are often a result of infections, injuries, allergies, and underlying health conditions, can significantly affect a horse's mobility and overall health. Traditional treatments include antibiotics, anti-inflammatory drugs, cold therapy, compression bandaging, and rest, but there is growing interest in natural remedies. For this purpose, argan and thyme oil were applied to 22 horses of various ages and breeds at different times at Mersin Doğa Horse Farm. Before and after the study, the health status and various behaviors of the horses were examined and recorded. These examinations and records were made separately for the administration of both argan oil and thyme oil. Positive effects on animal welfare have been observed due to the relief of pain and edema. In addition, there was a significant association between oils and the side effects of rash, itchiness, temperature increase, excessive drinking, and excessive urination ($P<0.05$). This study demonstrated that herbal ointments containing thyme oil, argan oil, paraffin, and Vaseline® effectively reduced leg edema and alleviated fatigue in horses compared with alternative formulations. By improving circulation, reducing inflammation, and protecting the skin, this ointment has the potential to enhance equine performance and recovery, especially after strenuous activity. The control formulation further supports the unique benefits of thyme and argan oils. Future trials involving direct application to horses are essential to validate these findings and optimize the formulation for wider equine therapeutic use.

Introduction

Horses can develop leg edema for a number of reasons. Edema can occur in only one leg, only in the hind legs, or in all four legs. Typically, swollen legs occur in the hind legs, in addition to being called filling, this condition may also be known as "stocking up" and is quite common. It is usually the area between the fetlocks and coronary bands that is affected. As a result of gravity, fluid can build up due to the leakage of fluid from blood vessels and tissues. This condition, called edema, can be caused by minor injuries like cuts or scratches or more serious conditions like cellulitis or lymphangitis. The accumulation of fluid in body tissues, commonly seen in the legs but also in other parts of the body, is referred to as edema in horses. Numerous factors, such as infections, wounds, allergies, heart illness, kidney issues, and liver abnormalities, can cause this syndrome (4). Horses' legs can be affected by far more serious conditions like cellulitis and lymphoma. Cellulitis is an inflammation of the skin and soft tissues directly beneath the skin (13). Lymphangitis develops when inflammation spreads to deeper tissues and vessels that move lymph throughout the body. Both can be caused by bacterial infections that enter a horse's skin through an open wound or scratch, and both require prompt veterinary care. The symptoms that horses may experience due to this condition are typically observed by the owner. Symptoms of edema include swollen leg joints in one leg, swollen leg joints in more than one leg, painful limbs, trauma to the

limbs, cuts or scratches on the lower legs, loss of appetite, fever, warmness of the legs to the touch, and lethargy (2).

Controlling inflammation in the affected area and lowering the risk of additional injury should be the goals of first aid for leg edema. A more routine approach, such as using a leg brace, bandaging, or rubbing the legs with liniment or oil, is recommended for mild episodes of edema. Other treatment methods include cold therapy, abscess treatment, and antibiotics and anti-inflammatory medications. Cold therapy is the first-line treatment for edema. Cold therapy helps constrict damaged blood vessels, which will reduce ongoing internal bleeding and fluid accumulation in the injured tissue and providing some pain relief by numbing nerve endings (4).

In mild cases of edema-relieving gel, such as RAPIGEL®, the gel can be applied twice daily for the first few days after the injury to soothe the legs and help reduce tissue swelling (22). Thyme oil is obtained from the thyme plant (Thymus vulgaris) through the process of steam distillation. It has a long history of use in traditional medicine because of its diverse therapeutic properties. Thyme oil contains active compounds such as thymol, carvacrol, and terpinene, which play a role in its medicinal effects (15). It has been acknowledged for its potential in reducing edema as it exhibits anti-inflammatory and diuretic properties while also stimulating the lymphatic system. For topical application, thyme oil can be diluted with a carrier oil and used in massage therapy (6, 15).

Argan oil is a natural oil derived from the kernels of the argan tree (Argania spinosa), which is native to Morocco. It is rich in essential fatty acids, antioxidants, and various beneficial compounds (10). While argan oil is primarily known for its cosmetic and skincare applications, it may also have potential effects on pain relief. Although its effects on edema have not been extensively studied, argan oil possesses properties that may contribute to reducing edema, such as anti-inflammatory, moisturizing, nourishing, and antioxidant properties. In addition, argan oil may help stimulate lymphatic circulation. The lymphatic system plays a crucial role in fluid balance and waste product removal from tissues. By enhancing lymphatic flow, argan oil may reduce edema and promote fluid drainage (10, 16). The ability of an animal to adjust to its surroundings painlessly and to maintain both physical and mental health is known as animal welfare. Massage treatments, including vegetable oils, have been shown to ease stiff joints and muscles, increase blood flow, and lessen edema. Animals experience less pain, and their welfare level increases as a result of improved blood circulation and decreased edema (18). To our knowledge, no studies have investigated the application of argan or thyme oil for the treatment of edema in horses. The effectiveness of argan oil and thyme in horses with leg edema was assessed in this study.

Materials and Methods

Ethical Statement: The study was approved by the Selçuk University Faculty of Veterinary Medicine Experimental Animal Production and Research Center Ethics Committee (Decision No. 2024/051, Date: 28.03.2024).

The animal material of the study consisted of 22 horses of various ages (ranging from 2 to 16 years, with a mean age of 9 years) and different breeds housed at “Doğa Horse Farm” in Mersin. The research horses were randomly selected from the facility’s population. All horses were housed in individual stalls, provided with adequate shelter, and provided access to clean drinking water at all times. A control group was not used in this study because the efficacy of the base ingredients—Vaseline® and paraffin—has been well documented in prior studies and clinical applications. Retrospective data from past experience consistently demonstrate the moisturizing and protective properties of these substances, making them a reliable foundation for topical treatments. Similarly, thyme and argan oils have shown strong anti-inflammatory and skin-repairing effects in various animal care practices. Given this well-established baseline, we focused on evaluating the combined effects of these ingredients at different concentrations, building on their known benefits, and optimizing their application for horse leg health. Thus, while a control group could provide further comparative insights, the decision to omit it in this study was based on these solid, previously established data points. Feeding is done in the morning, noon, and evening, and the daily feed consists of 4 kg of oats, 2 kg of barley, 1 kg of ready-made feed with a high vitamin, mineral, and protein ratio, 6 carrots, 6 apples, and 10 kg of hay. Thyme and argan oils were applied to the horses at different times. The horses’ performance before and after treatment, as well as the psychological and physiological changes induced by the oils, were observed. The age, gender, breed, and coat color of the horses were obtained from pedigree records kept by the Turkish Equestrian Federation. Table 1 lists the horse information used in the study.

Preparation of Thyme Oil and Argan Oil Mixes: Vaseline®, paraffin, thyme oil, and argan oil were all bought from stores. Analytical grade reagents were all used exactly as supplied. Vaseline’s exceptional ability to create a protective barrier on the skin makes it a prominent ingredient in ointments. Like vaseline, paraffin is a waxy material that is frequently used to ointments because of its ability to build a barrier against moisture. First, an ointment mixture was prepared at room temperature using equal amounts of paraffin and Vaseline®. Thyme oil and argan oil were then added to the mixture at a ratio of one part oil to two parts paraffin/Vaseline®. To ensure comprehensive results and assess the efficacy of the different formulations, tests were conducted using varying amounts of thyme and argan oil. These adjustments included

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Table 1. Numbers, ages, genders, colors, and breeds of the horses used in the study.

Horse Number	Age	Gender	HorseCoat Color	Breed
1	6	Female	Flea-Bitten Gray	Belgian Draught
2	9	Female	Chestnut	Hannover
3	9	Male	Dapple Gray	Hannover
4	15	Male	Bay	Belgian Draught
5	7	Male	Bay	Hannover
6	16	Female	Chesnut Bay	Hannover
7	9	Male	Bay	Hannover
8	2	Female	Chesnut Bay	Hannover
9	2	Male	Chesnut	Hannover
10	11	Male	Bay	Thoroughbred
11	10	Male	Black	Thoroughbred
12	6	Female	Chesnut	Thoroughbred
13	6	Male	Bay	Thoroughbred
14	8	Male	Chesnut	Thoroughbred
15	1	Male	Bay	Thoroughbred
16	7	Female	Chesnut	Thoroughbred
17	8	Female	Chesnut	Thoroughbred
18	4	Male	Chesnut	Arabian
19	7	Female	Dapple Gray	Arabian
20	11	Female	Chesnut	Pony
21	6	Male	Dapple Gray	Pony
22	7	Male	Mixed Color	Pony

different ratios of oil to paraffin/Vaseline® base (e.g., 1:1, 1:2, and 2:1). This allowed for the evaluation of which concentration in the trial had the most beneficial effect on lowering fatigue and leg edema.

The Application of Thyme and Argan Oils: For two minutes, each produced oil mixture was administered to each horse's leg. For each leg, five milliliters of oil were administered. It was applied to the suspected pain or swollen areas for 5 min. In addition to the legs, it was used for friction or massage to target troublesome muscle groups. During the application, no bandage was used to stop absorption. Within an hour of training, the horses were observed to record the required data. After that, soap and cold water were used to cleanse the oily regions.

Throughout the three days, the research horses received thyme oil 10 min before training. After 1 week and for 3 more days, argan oil was administered 10 min prior to exercise. From the beginning of the hoof capsule to the higher part of the carpal joint in the front legs and from the end of the hoof capsule to the upper portion of the tarsal joint in the rear legs, oils were applied to all four of the horses' legs. The farm's trainer, veterinarian, and horse caretaker reviewed the gathered information. Until the legs were cleaned, data were continuously recorded during and after exercise. After washing, the legs were observed for 10 minutes every 2 hours.

Evaluation of Psychological and Physiological Parameters: There are two types of edema. Peripheral edema, characterized by swelling in the legs, can vary depending on the body position. The skin over the swollen area is tight and shiny. Pressure applied to this region creates an indentation, known as peripheral or pitting edema. The regions without visible swelling and where no indentation forms upon pressure are considered non-edematous. Pulmonary edema, another form of edema, was not examined in this study.

When an area of pain is squeezed with fingers, the horse may react by trying to bite, kick, or escape. If the horse displays these discomfort behaviors when body parts like joints are flexed, this indicates the presence of pain. Horses that do not exhibit these behaviors are considered pain-free.

Horses that exhibit itching behavior have been observed scratching the itchy area with the tip of their nose or by using a surface.

In the evaluation of redness, any color changes close to red in the area were considered positive.

Horses that behave differently towards their caregivers and trainers in the stable or paddock (such as biting, kicking, trying to escape, or trying to throw the rider) are considered aggressive.

Horses with more feces and urine than usual in their stalls or those frequently observed defecating and urinating around people are considered positive for excessive defecation and urination. It is noted that horses typically hesitate to defecate and urinate in the presence of unfamiliar individuals.

Horses that do not sufficiently rest while standing or do not sleep lying down are observed to be tired during training and exhibit a decrease in performance.

Problematic areas typically have higher temperatures than similar regions. Areas with detected temperature increases during manual examination are considered positive.

Restless horses tend to scrape the ground and lick painful or itchy body parts; these behaviors are recorded as positive.

Hair loss or scaly skin is considered an irritation and side effect in areas where oil is applied.

Statistical Analysis: Chi-square analysis was conducted to evaluate the side effects of argan and thyme oil in horses. Descriptive statistics are presented as numbers and percentages. Results were deemed significant when the P-value was less than 0.05. The data were analyzed using SPSS version 21.

Results

In this study, the psychological and physiological changes in horses induced by the oils evaluated were as follow; rash, burning, pain, smell, itchiness, temperature increase, restlessness, swelling, decrease in edema, hair loss, sleep disturbance, loss of appetite, struggling, irritation, scratching the ground, kicking, aggression, leg/hoof licking, lack of water intake, drinking too much water, excessive urination, excessive defecation, and increase or decrease in performance. Figure 1 shows the effects observed after the application of thyme and argan oil.

As shown in Figure 2, the application of thyme oil caused rashes in most of the horses. Primary irritation occurs rapidly the first time an essential oil is used, presenting as red wheal or burn. This reaction is more

Figure 1. Oils applications to areas of concern in horses.

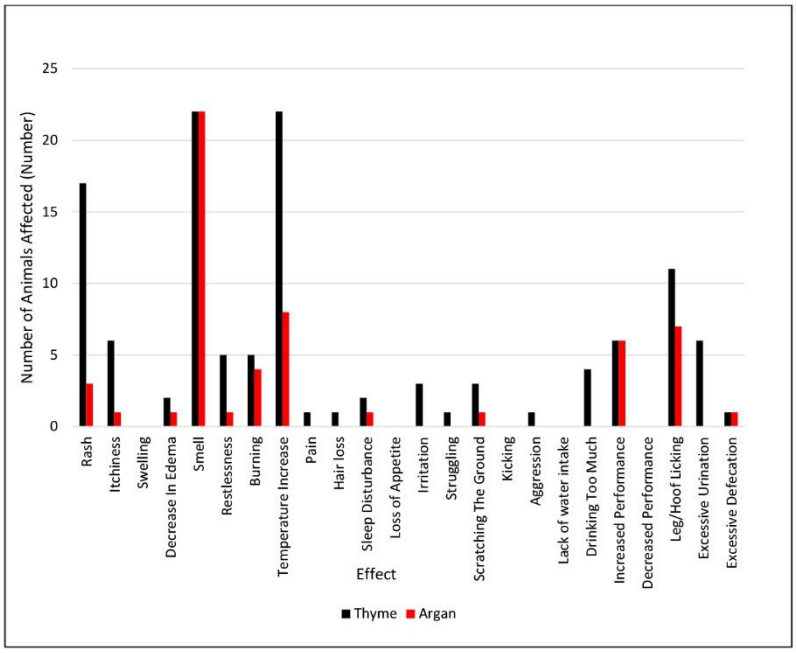

Figure 2. Side effects observed after the application of thyme and argan oil.

common when essential oils contain high concentrations of compounds such as thymol (found in thyme). The skin reaction is typically confined to the area where essential oil is applied (5).

In addition, thyme oil has caused a rise in temperature within the regions of interest for all horses. Since thyme oil is well known for its aromatic properties, all the horses' regions of interest had a strong smell. Regarding reducing edema, thyme oil did not exhibit any beneficial effects except in the cases of horse number 1 and 2. The use of thyme oil did not have any significant effect on symptoms such as swelling, loss of appetite, or kicking, and it did not decrease the performance of the horses. In contrast, the performance of horse number 1, 2, 3, 6, 10, and 16 improved.

In this study, following the administration of thyme oil, horse number 1 experienced a reduction in fetlock edema, while horse number 2 and 3 demonstrated a decrease in swelling and pain. Additionally, horse number 20 initially experienced muscle pain in the right shoulder, but after the application of thyme oil, the pain decreased. Table 2 lists some observations made before and after the application of thyme oil.

Argan oil did not cause any rashes except for horse number 3, 19, and 21. Did not cause any itchiness, restlessness, burning, sleep disturbance or excessive defecation. Argan oil did not exhibit any noticeable effect on symptoms like swelling, pain, hair loss, appetite loss, kicking, abnormal drinking behavior (either excessive or insufficient water intake), excessive urination, or overall performance of the horses. In contrast, the performance of horse number 1, 3, 6, 7, 10, and 18 improved.

Although argan oil did not reduce edema in horse number 1, the horse exhibited improved comfort while using the foot affected by tendonitis. Horse number 2 did not experience a decrease in swelling, whereas horse number 3 exhibited a reduction in swelling. In contrast to thyme oil, the application of argan oil did not alleviate the pain experienced by horse number 20. Argan oil is all of the horses regions of interest had a strong smell. Table 2 shows observations made before and after the application of argan oil.

A comparison of the side effects observed when using thyme oil and argan oil was performed using Chi-square analysis (Table 3).

When comparing the effects of thyme oil and argan oil, significant differences were observed in several side effects, while others showed no notable differences. For rash, argan oil had a markedly better side effect profile, with only 3 cases of rash out of 22 compared with 17 cases for thyme oil. This difference was statistically significant with a P-value of $p<0.001$, indicating that argan oil had fewer rash side effects. Similarly, for itchiness, argan oil performed better, with only 1 case compared to 6 cases for thyme oil (P-value of 0.039), showing a significant reduction in itchiness as a side effect with argan oil. Regarding restlessness, there was a trend suggesting that it might be more common with thyme oil (5 cases) than with argan oil (1 case), although this difference was not statistically significant (P-value of 0.079). Both oils had similar burning sensation profiles, with no significant difference (P-value of 0.709). Temperature increases were significantly more common with thyme oil, occurring in 22 cases compared with 8 cases with argan oil (P-value of 0.000). Other side effects such as pain, hair loss, sleep disturbance, and ground scratching were not significantly different between the oils. A slight reduction in edema was observed more frequently with thyme oil (2 cases) than with argan oil (1 case), but the difference was not statistically significant (P-value of 0.555). Irritation was slightly more common with thyme oil (3 cases) than with argan oil, with a P-value of 0.073, in the cating a trend but not statistical significance. Thyme oil also exhibited a higher incidence of excessive urination (6 cases compared to none for argan oil), with a, significant P-value of 0.008. Both oils showed similar results for other side effects, such as excessive defecation and leg/hoof licking, with no significant differences. "Drinking too much" was more commonly absent with argan oil (P-value of 0.036). Since both oils did not cause symptoms such as swelling, loss of appetite, kicking, lack of water intake, or performance reduction, and both resulted in a noticeable smell, they are considered equivalent regarding these particular side effects.

Table 2. Observations noted before and after the application of thyme oil and argan oil.

Horse No.	Before Application	After Application of Thyme Oil	After Application of Argan Oil
1	The horse's posterior fetlock joints were edematous. It had left anterior tendonitis.	The horse was comfortable during training, and the edema in the fetlocks decreased.	The edema was not reduced; the horse used the foot with tendonitis more comfortably.
2	Right carpal joint swollen due to bone growth.	The horse was comfortable during training, and the swelling decreased.	The horse was comfortable during training, and the swelling did not decrease.
3	Anterior fetlock joint swelling due to capsular enlargement and anterior right chronic tendinitis.	Swelling has not decreased, but tendon pain has decreased.	The swelling decreased and the horse used his tendinitis foot more comfortably.
4	-	-	-
5	Bone growth at the posterior left phalanx two	The horse has no complaints before or after the application.	The horse has no complaints before or after the application.
6	Two front fetlock joints broken part	The horse was comfortable during training.	The horse used its forelegs better during training.
7	Inflammation of the right navicular bone	The horse has no complaints before or after the application. The horse was comfortable during training.	The horse has no complaints before or after the application. The horse was comfortable during training.
8	The two posterior hocks have beaks	The horse has no complaints before or after the application. The horse was comfortable during training.	The horse has no complaints before or after the application. The horse was comfortable during training.
9	-	-	-
10	The fragment of the left anterior fetlock joint has undergone stippling.	The horse was comfortable during training.	The horse was comfortable during training.
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	-	-	-
16	An old crack in the left phalanx, stumbling.	Horse stumbling decreased during training.	The stumbling continued.
17	-	-	-
18	The horse had a sore shin and underwent cold cauterization.	The horse has no complaints before or after the application.	The horse has no complaints before or after the application. The horse was comfortable during training.
19	-	-	-
20	Muscle pain in the right shoulder	Muscle pain decreased.	Muscle pain did not subside.
21	-	-	-
22	No problem, the horse is blind in both eyes.	The horse has no complaints before or after the application.	The horse has no complaints before or after the application.

- : The horse had no pre- or post-treatment problems

Table 3. Comparison of side effects observed in subjects treated with thyme oil and argan oil, including their absence or presence and the associated P-values indicating statistical significance.

Side Effect		Oil		P
		Thyme Oil n (%)	Argan Oil n (%)	
Rash	Absent	5 (22.7)	19 (86.4)	0.000***
	Presence	17 (77.3)	3 (13.6)	
Itchiness	Absent	16 (72.7)	21 (95.5)	0.039*
	Presence	6 (27.3)	1 (4.5)	
Decrease in edema	Absent	20 (90.9)	21 (95.5)	0.555
	Presence	2 (9.1)	1 (4.5)	
Restlessness	Absent	17 (77.3)	21 (95.5)	0.079
	Presence	5 (22.7)	1 (4.5)	
Burning	Absent	17 (77.3)	18 (81.8)	0.709
	Presence	5 (22.7)	4 (18.2)	
Temperature increase	Absent	0 (0.0)	14 (63.6)	0.000***
	Presence	22 (100.0)	8 (36.4)	
Pain	Absent	21 (95.5)	22 (100.0)	0.312
	Presence	1 (4.5)	0 (0.0)	
Hair loss	Absent	21 (95.5)	22 (100.0)	0.312
	Presence	1 (4.5)	0 (0.0)	
Sleep disturbance	Absent	20 (90.9)	21 (95.5)	0.550
	Presence	2 (9.1)	1 (4.5)	
Irritation	Absent	19 (86.4)	22 (100.0)	0.073
	Presence	3 (13.6)	0 (0.0)	
Struggling	Absent	21 (95.5)	22 (100.0)	0.312
	Presence	1 (4.5)	0 (0.0)	
Scratching the ground	Absent	19 (86.4)	21 (95.5)	0.294
	Presence	3 (13.6)	1 (4.5)	
Aggression	Absent	21 (95.5)	22 (100.0)	0.312
	Presence	1 (4.5)	0 (0.0)	
Drinking too much	Absent	18 (81.8)	22 (100.0)	0.036*
	Presence	4 (18.2)	0 (0.0)	
Increased performance	Absent	16 (72.7)	16 (72.7)	0.999
	Presence	6 (27.3)	6 (27.3)	
Leg/Hoof licking	Absent	11 (50.0)	15 (68.2)	0.220
	Presence	11 (50.0)	7 (31.8)	
Excessive urination	Absent	16 (72.7)	22 (100.0)	0.008**
	Presence	6 (27.3)	0 (0.0)	
Excessive defecation	Absent	21 (95.5)	21 (95.5)	0.999
	Presence	1 (4.5)	1 (4.5)	

*: P<0.05, **: P<0.01, ***: P<0.001.

Discussion and Conclusion

Edema in horses is characterized by an abnormal buildup of fluid in the body tissues, resulting in swelling. Although it predominantly occurs in the legs, it can also manifest in other parts of the body. Thyme is widely used in traditional medicine and phytotherapy (24). Essential oils possess a great variety of biological properties, including antibacterial (21, 25), antifungal (12), anthelmintic (11), insect repellent (7), antioxidant (6), and anticancer (20, 25) effects, which are often attributed to their high yield of phenolic compounds, i.e., thymol and carvacrol. Up to now, little is known about the anti-inflammatory effects of thyme oil (14) though there is strong evidence that the antioxidant potential of phenols such as thymol is associated with their inhibitory effects on inflammatory processes (3).

Fachini-Queiroz et al. (9) investigated the effects of thyme oil on the inflammatory response and edema

reduction in a mouse ear model (9). To induce cutaneous inflammation, 5% croton oil (10 µL) in acetone was applied to the inner surface of the right ear of each mouse. Thymol (10 mg per ear) was topically administered to the right ear. Contrary to expectations, thymol did not reduce the development of edema but instead caused an irritative response, likely due to the release of histamine and prostanoids. However, the study findings suggest that thymol's anti-inflammatory effect is associated with its ability to inhibit inflammatory edema and the migration of leukocytes.

Abdelli et al. (1) investigated the composition of essential oils extracted from the leaves of Thymus vulgaris in two regions of Northwestern Algeria, Mostaganem and Tlemcen. The researchers also aimed to assess the acute oral toxicity and anti-inflammatory properties of essential oils using the carrageenan-induced paw edema test in vivo (1). Carrageenan-induced paw edema is a commonly used experimental model of inflammation characterized by biphasic development of edema (22). The administration of different doses of Thyme oil to mice resulted in a significant and highly noteworthy reduction in edema compared with the control group, starting at 4 hours post-treatment ($P<0.001$). These findings are consistent with a prior investigation into commercially available thyme oil (17).

The anti-inflammatory effects of thyme oil can be primarily attributed to its main component, thymol. Previous studies have provided evidence of its anti-inflammatory properties of thymol (8, 19). This study clearly demonstrated that thyme oil exhibits substantial anti-inflammatory activity even at doses well below toxic levels.

There is limited scientific research investigating the effects of argan oil on edema. Argan oil is primarily known for its cosmetic and culinary uses, rather than its medicinal properties. Although argan oil contains various bioactive compounds that may have potential anti-inflammatory effects, there is currently insufficient evidence to support its effectiveness in reducing edema. Makbal et al. (16) assessed acute and subacute toxicity, as well as the anti-inflammatory and antioxidant effects of argan extract (16). The results showed that argan extract significantly inhibited xylene-induced ear edema in mice. In addition, the extract significantly reduced paw edema in mice following carrageenan injection. These findings suggest that argan extract has promising anti-inflammatory and antioxidant properties.

Although studies conducted on mice have demonstrated the anti-inflammatory effects of thyme and argan oils, no clinical field study has directly applied these findings to horses. This lack of research highlights the uncertainty regarding whether results obtained from mice can be directly translated to equine applications. Given the high economic value of racehorses, particularly in terms of performance and breeding, it is crucial to conduct studies directly on these horses to ensure more reliable and species-specific data. Testing treatments for leg edema and fatigue prevention in horses is essential to safeguard their health and optimize their performance. Therefore, moving beyond mouse findings to clinical trials in horses is significant.

During the course of the study, several noteworthy observations were made. Horse number 22, who was blind, displayed fear in response to the application of the oils. An interesting observation was made in horse number 1 and 3, both of whom received irritant medication for treating tendon inflammation, as they exhibited reactions similar to those observed in horse 18. Another observation pertained to hair reduction and thinning of skin on the metacarpus 3 bones of horse 18 due to cold cauterization, which indicated heightened reactions towards the oils. To address shoulder muscle pain experienced by horse number 20, larger volumes of oil were generously applied to the affected area. It was observed that both the benefits and side effects increased with increasing oil content. Additionally, it was noted that smaller breeds such as ponies and horses, with gray frost coloration had a higher incidence of side effects. Thyme oil, known for its stronger aroma and greater effectiveness in relieving pain and reducing swelling, has exhibited more side effects (8,19). The study results are consistent with the literature and showed that thyme oil has anti-inflammatory effects in vivo. Thymol has an irritative effect on the other hand, argan oil demonstrated properties such as improved blood circulation, skin soothing, and preventing irritation. Experiments involving the combined use of both oils were conducted, which resulted in greater overall benefits with fewer side effects. These findings suggest the potential utility of such studies in the future.

Leg edema in horses is the accumulation of fluid and subsequent swelling in the legs, which is primarily observed in the lower limbs. It can manifest in one leg or affect multiple legs, with a higher prevalence in the hind limbs. The condition can arise from various causes, including infections, injuries, allergies, heart disease, kidney problems, liver disorders, and underlying health issues.

Treatment for leg edema in horses aims to address the root cause while managing swelling and providing relief. Veterinary care is typically necessary, and treatment may involve the administration of medications such as diuretics, anti-inflammatory drugs, or antibiotics, depending on the specific underlying condition. Supportive measures may include cold therapy, bandaging, massage, controlled exercise and ensuring a balanced diet. Thyme oil, derived from the thyme plant, has anti-inflammatory and diuretic properties and can

stimulate the lymphatic system. Argan oil, extracted from the argan tree, is known for its moisturizing, and antioxidant qualities and may enhance lymphatic circulation. Although research on the specific use of these oils for treating horse edema is limited, this study aimed to investigate their efficacy in addressing this condition. Thyme oil, renowned for its potent scent and notable efficacy in pain and swelling relief, was associated with a higher incidence of side effects. Conversely, argan oil has attributes such as enhanced blood circulation, skin soothing, and irritation prevention. Experimental studies investigating the combined application of both oils yielded superior overall advantages while minimizing adverse reactions. These findings indicate the potential value of further research in this area.

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Ethical Statement

The study was approved by Selçuk University Faculty of Veterinary Medicine Experimental Animal Production and Research Center Ethics Committee (Decision no: 2024/051, Date: 28.03.2024).

Conflict of Interests

The authors declare that they have no conflict of interests.

Author Contributions

Conceptualization, Y.P.; writing-original draft preparation, Y.P. and N.K.; data analysis, M.Ç.G.; writing-review and editing, Y.P.; N.K. and M.Ç.G. All authors reviewed and approved the final version of the manuscript.

Data Availability Statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

Animal Welfare

The authors confirm that they have adhered to ARRIVE Guidelines to protect animals used for scientific purposes.

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