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Cold and wet wrap therapy for relieving erythema in canine atopic dermatitis and cutaneous adverse food reactions

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Abstract:

The frequent use of humidified bandages for diminishing inflamed tissue related to atopic dermatitis, is a well-known old remedy. This study aimed to evaluate the potential therapeutic effects of cold and wet bandage therapy (co-wewt) on canine atopic dermatitis (cAd) and cutaneous adverse food reactions (cAFr). Comparative analysis of epidermal temperature and erythema scores was performed by an expert group to determine the efficacy of co-wewt therapy and the place of this treatment approach in clinical practice. In the present study co-wewt by use of Pertek Thermal Water was well tolerated in both dogs with cAd and cAFr, due to probable cooling effect on the cutaneous tissue and the rapid improvement in skin inflammation This was supported by the comparative evaluation of altered epidermal temperature (33.49 ± 0.21 vs 23.62 ± 0.95) and VAS-ESS score [ADASI 3.25 ± 0.17 vs 0.38 ± 0.13, respectively before and after co-treatment], given as $\bar{X}$ ± SE ($p<0.001$). The findings show that the co-wewt protocol applied with Pertek Thermal Water may be an effective treatment option in reducing inflammation due to cAd and cAFr.

Keywords: Atopy, cold, dog, water, wet.

Köpek atopik dermatiti ve kutanöz advers gıda reaksiyonlarında eritemi gidermek için soğuk ve ıslak sargı tedavisi

Özet:

Atopik dermatite bağlı inflamasyonlu dokuyu azaltmak için nemlendirilmiş bandajların sıklıkla kullanılması, iyi bilinen eski bir tedavi yöntemidir. Bu çalışma, soğuk ve ıslak bandaj tedavisinin (co-wewt) köpek atopik dermatiti (cAd) ve kütanöz advers gıda reaksiyonları (cAFr) üzerindeki potansiyel terapötik etkilerini değerlendirmeyi amaçlamaktadır. Epidermal sıcaklık ve eritem skorlarının karşılaştırmalı analizi, co-wewt tedavisinin etkinliğini ve bu tedavi yaklaşımının klinik uygulamalardaki yerini ortaya koymak amacıyla uzman bir grup tarafından gerçekleştirilmiştir. Bu çalışmada, Pertek Termal Suyu kullanılarak co-wewt, deri dokusu üzerindeki muhtemel soğutma etkisi ve deri inflamasyonundaki hızlı iyileşme nedeniyle hem cAd hem de cAFr'li köpeklerde iyi tolere edilmiştir. Bu durum, $\bar{X}$ ± SE olarak verilen, değişmiş epidermal sıcaklık (33,49 ± 0,21 vs 23,62 ± 0,95) ve VAS-ESS skoru [2,25 ± 0,17 vs 0,38 ± 0,13, sırasıyla birlikte sağaltımdan önce ve sonra] ($p <0,001$) ile [ADASI 3,25 ± 0,17 vs 0,38 ± 0,13, sırasıyla birlikte sağaltımdan önce ve sonra] karşılaştırmalı olarak değerlendirilerek desteklenmiştir ($p<0,001$). Elde edilen bulgular, Pertek Termal Suyu ile uygulanan co-wewt protokolünün, cAd ve cAFr'ye bağlı inflamasyonu azaltmada etkili bir tedavi seçeneği olabileceğini göstermektedir.

Anahtar kelimeler: Atopi, ıslak, köpek, soğuk, su.

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Introduction

Wet wrap therapy (wwt), has been denoted as a supportive therapeutical non-invasive intervention model through use of a double layer of tubular bandage/ gauze, involving a moisty initial inner layer and other relevant dry second outer layer (Devillers and Oranje, 2006). This treatment modality has been preferred frequently, against atopic dermatitis (AD). The Mayo Clinic in USA used and suggested wet dressings nearly 100 years ago against combatting pruritic dermatoses (Bingham et al., 2009; Quinones and Winkelmann, 1967). Apart from several different techniques and small scale case reports were reported between 1970-1980 (Hawkins, 1978; Nicol, 1987), indeed in 30 pediatric AD cases casting 'wet wrap' terminology – suggesting that wwt as a significantly effective therapeutical intervention against acute erythrodermic eczema (Goodyear, 1991). Our researcher group for interest to this subject was aroused following preliminary success with 10-14°C, relatively cold, wwt in several clinical trials almost every Tuesday, which was denoted as wcwt. Hence the purpose of the present study was to elucidate the efficacy of co-wewt among dogs with cAd and cAFr.

Material and Methods

Demographic data

In a total of 11, pure-bred (n=6) and crossbred (n=5) client-owned dogs, at the age of 2 to 9 years old, of both sexes (n= 6 male, n=5 female) and various sizes with a diagnosis of cAd (n=7) or cAFr (n=4) on referral to Faculty Clinic to interested researchers participated at this study. Diagnosis of cAd or cAFr were mainly based on relevant literature (Hensel et al., 2015; Favrot et al., 2010; Ural et al., 2020; Ural, 2022). Diagnostic approach was shown in table 1.

Scoring methodology

In an attempt to assess erythema severity dermatological lesional areas were inspected either 1) with erythema severity scores of 0 to 3 through visual analogue scale (VAS) and named as visual analogue scale erytheme severity score (VAS-ESS) as reported firstly (Cugmas and Olivry, 2021), similar to previous denomination (Ural et al., 2023a) or 2) Psoriasis Area and Severity Index (PASI) scores of 0 to 4 and named as Atopic Dermatitis Area and Severity Index (ADASI), similar to previous study (Ural et al., 2023a). The present study was performed taking into account written form of Guide for the Care and Use of the Laboratory Animals with respecting all animals' rights. Adnan Menderes University Animal Experiments Local Ethics Committee, namely HADYEK report no: 64583101/2018/014 (30/01/2018) was available.

co-wewt therapy module

Natural thermal water (Pertek Thermal Water, Pertek, Türkiye) was the choice of natural treatment modality as because to its unchanged unique and incomparable ingredient without any additives. Chemical composition of Pertek Thermal Water was as follows: 41 °C welding heat with pH=6.53 and selected chemical composition [unit (mg/dL)] of bicarbonate 2025, calcium 366.94, sulphate < 0.1 , magnesium 74.61 and sodium 0.33. This treatment modality was previously used against dog with inflammatory bowel disease and dermatological signs, in which Pertek Thermal Water composition was used (Ural et al., 2023b). Briefly in an attempt to prepare co-wewt therapy module; Pertek Thermal Water was colled down to 10-14°C, and was stabilized between this temperature during bandaging, by use of ice cubes. Bandages were soaked/ drenched with this water and then immediately covered to the lesional area (i.e. erythema and alopecia) and left there for 6 minutes. Figure 1 showed selected cases enrolled at this study. The co-wewt therapy was administered twice daily over a period of 10 days. Throughout the treatment, none of the dogs received any form of immunosuppressive or antibiotic therapy,

Table 1. Differenatial diagnosis and relevant analytes preferred at this study. Apart from diagnostic criteria elimination diet trial was evident. After completion of trial entire dogw were subjected to Virbac Digestive Support Dog Food and Vetexpert Intestinal Dog Food in an altered calendar for at least 6 weeks between switching.

A	B	C	D
Epidermal corneometric analysis [i.e. epidermal hydration and pH] by use of Callegari Soft Plus Device	Dermatosopic examination by DL4 DermLite	Clinical scroign [i.e. CADESI-04 and Vas pruritus]*	Determination of immunoglobulin (Ig)E by in vivo allergen-specific IgE testing (Polycheck®, German, Turkish side distrbutor RDA Group, Istanbul).

Figure 1. Depicting co-wewt therapy module including Pertek Thermal Water bandaging.

ensuring that the observed effects were solely attributable to the co-wewt protocol.

Results

Clinical photographing

Selected case with a severe erythema score prior to and thereafter co-wewt therapy module including Pertek Thermal Water bandaging were shown at figure 2a and 2b. Photographic records were taken 1 week apart prior to and thereafter co-wewt. Erythema scores were diminished. VAS-ESS and ADASI scores were both diminished in 2 cases were shown from data archive.

Figure 2. 2a and 2b showing 2 different cases prior to and thereafter co-wewt therapy module including Pertek Thermal Water bandaging.

VAS-ESS and ADASI scores: clinical interpretation

Results were deemed available at table 2 along with statistical significance. Values were deemed available as ± SE and p values. Also were shown on table 2 and figure 3a-c; statistically significant alterations among VAS-ESS and ADASI scores were obtained prior to and thereafter co-wewt therapy with Pertek Thermal Water. No adverse reactions were observed in any of the dogs enrolled.

Table 2. Statistically significant alterations in VAS-ESS and ADASI scores before and after co-wewt therapy with Pertek Thermal Water.

	Prior to treatment	After treatment	P value
	$\overline{X}$±SE	$\overline{X}$±SE	
Skin Temperature (°C)	33.49±0.21	23.62±0.95	0.001
VAS-ESS	2.25±0.17	0.38±0.13	0.001
ADASI	3.25±0.17	0.38±0.13	0.001

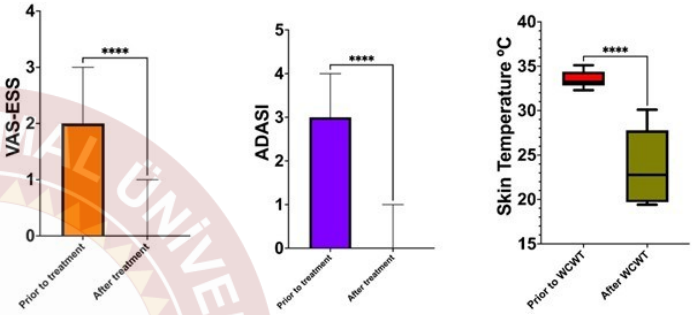

Figure 3. 3a) VAS-ESS and 3b) ADASI scores adopted at this study depicted by boxplot analytes presenting erythema severity. By this way two different diagnostic approach was validated (Cugmas and Olivry, 2021) also was presented previously (Ural et al., 2023).

Discussion

Topical cooling has been preferred commonly as a remedy relieving pruritus. Given cooling a) the intergumentary system through application of cold water, ice, cool compresses or gel usage diminished pruritus for a time among atopic dermatitis patients (Fruhstorfer et al., 1986) and b) diminished or devastated pruritus and cutnaeous erythema caused by experimental injection of histamine (Bromma et al., 1995; Fruhstorfer et al., 1986), we herein at this study as a novel strategy both aimed to relieve erythema and pruritus by use of co-wewt among dogs with cAd. Taking in to account erythema interpretation to 2 invalid scoring system, were previously used (Ural et al., 2023a). Relevant clinical scores involving VAS-ESS and ADASI, for remarkable interpretation of erythema, revealed significant differences following co-wewt with Pertek Thermal Water. Hence supportive evidence included [± SE], altered epidermal temperature (33.49 ± 0.21 vs 23.62 ± 0.95) and VAS-ESS score (2.25 ± 0.17 vs. 0.38 ± 0.13, prior to and thereafter co-wewt, respectively) ($p < 0,001$) in comparison to (ADASI 3.25±0.17 vs. 0.38±0.13, prior to and thereafter co-wewt, respectively) ($p < 0,001$). All diminished erythema scores revealed the efficacy of co-wewt with Pertek Thermal Water bandaging, which was took place in our routine practice after completion of our study with satisfactory results.

For anti-itching efficacy of cooling among mice, continuous

cold stimulation is necessary. Interestingly pruritic behavior quickly returned back even if the skin surface was warmed to neighboring temperature (Fruhstorfer et al., 1986). Among TRPM8-deficient mice, the anti-ithcing efficacy of mild cooling (20° C) were terminated. On the other hand cooling with underneath temperatures i.e. cold (≤17° C) diminished itching behavior in TRPM8-deficient mice, denoting that TRPM8-free cold-sensitive tools bestow to thermal sensing at lower temperatures (Liu and Jordt, 2018). Herein at the present study we preferred 10-14° C cold water prepared in ice filled containers and cold water (Pertek Thermal Water), which were then stabilize somewhere between 10-14° C. Also was also evidenced, however not statistically analyzed at the present study co-wewt with Pertek Thermal Water, pruritus was diminished in almost every case involved.

In a prior cohort study wet-wrap therapy was preferred as a therapeutic intervention for moderate-to-severe atopic dermatitis. In this observational cohort study main outcome was improvement in atopic dermatitis severity, established within SCORAD (Scoring Atopic Dermatitis). Through a paired t test, the SCORAD at inital referral and at recovery presented significant alterations in mean±SD values, of 49.68 ± 17.72 vs.14.83 ± 7.45, respectively (P<0.001) without systemic immunosuppressive therapy, in which solely 31% were received antibiotic. The latter research presented the beneficial wet-wrap therapy as an acute intervention with lasting efficacy 1 month after discontinuing (Nicol et al., 2014). In the present study, during co-wewt with Pertek Thermal Water bandaging the CADESI-04 at admission and at discharge showed diminished values [31-90 to 12-37], respectively for both dogs with cAd cAFr. None of those dogs were receiving any immunosuppressive or antibiotic therapy during the treatment. Nor side effects were observed during co-wewt with Pertek Thermal Water bandaging.

Bacteria gave counter to a quick climatic drop (cold shock) by a temporary/short term debut of cold induced proteins (Graumann and Marahiel, 1996; Phadtare, 2004) and the existance of the latter proteins elevated with the degree of the cold shock (Hébraud and Potier, 1999). Given Escherichia coli several different cold shocked proteins have been recognized i.e. cold shock protein (Csp) family (Yamanaka et al., 1998), and other relevant ones. Cold shock proteins frustrate selected detrimental sequels of climatic deceleration causing aiding cells adaptation (Phadtare, 2004). Following prompt cold shock answering, cold shock protein synthesis diminished whereas other proteins elevated. The latter permitted the cells to grow at low climated, even at a slower rate (Ermolenko and Makhatadze, 2002). Cold shock proteins were firstly detected among bacteria, in which an immediate declined temperature from 37 °C to 10 °C was capable of elevating 200-fold increase in cold shock protein A exhibition in several few minutes (Gottesmann, 2018; Jones and Inouye, 1994). In the present study although technically and economically (this was self budget Project other then Pertek thermal Water was obtained and freely donated by charitable business man Mr. Selattin SEREFOĞLU), were unable to measure cold shock proteins, declined temperatures for cooling effects obtained at this study could be achieved by both the thermal efficacy/mineral richness of the Pertek Thermal Water and cold shock proteins existed and released from the liver at 10-14° C, preferred. Our subsequent study would be thus aimed at this subject.

Cold shock proteins are under an era of arousing interest, with several beneficial health supportive effects were determined. Given selected cold shock proteins are well recognized assist diminishing inflammation and induce a stress respond among human epidermis (Holland et al 1993), we decided to use this co-wewt by use of Pertek Thermal Water as was well tolerated in both dogs with cAd and cAFr, due to probable cooling effect on the cutaneous tissue and the rapid improvement in skin inflammation. This was supported by altered epidermal temperature, VAS-ESS and ADASI scores, prior to and thereafter co-wewt, respectively] (p <0,001). Clinical cure, as in parallel line with the purpose of this study, relieving of erythema onto the skin, was evident. Investigators of the present research frequently use co-wewt protocol with Pertek Thermal Water for diminishing disease activity against cAd and cAFr, following completion of research. We are keen on developing this treatment modality as an effective non-pharmaceutical support. It has been shown to be a relatively novel (due to to cold water enhancement) and effective treatment for cAd. For better understanding and further findings, our subsequent study would thus be aimed to search therapy-resistant cAd and intolerable pruritus to those dogs with unresponsive to multi drug options. Observed and available data of include rapid response to therapy, reduction in itch.

Conclusion

In conclusion, co-wewt therapy using Pertek Thermal Water showed promising effects in reducing inflammation and improving skin condition in dogs with cAd and cAFr. The treatment was well tolerated, and a significant reduction in epidermal temperature, VAS-ESS, and ADASI scores was observed, indicating effective clinical improvement, particularly

in reducing erythema. These findings support the potential of co-wewt therapy as a valuable treatment approach for inflammatory skin conditions in dogs.

The investigators have continued to use the co-wewt protocol following this research, with encouraging results in diminishing disease activity in cAd and cAFr. This non-pharmaceutical treatment modality offers a novel approach that may complement existing therapies. Future studies will aim to evaluate the effectiveness of this protocol in cases of therapy-resistant cAd and severe pruritus unresponsive to conventional treatments, to further understand its potential in challenging clinical scenarios.

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Ethical Statement: This study was approved by the Adnan Menderes University-HADYEK local ethics committee on 30/01/2018 with number 64583101/2018/014.

Conflict of Interest: There is no conflict of interest in this study.

Author Contributions: Idea, Design: KU; Data collection and/or processing: KU, HE, SE, CB; Analysis and/or commentary: KU, HE, SE, CB; Researching: KU, HE, SE, CB; Writing the article: KU, HE, SE, CB; Critical review: KU, HE, SE, CB.

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