VETERINARSKI ARHIV 82 (3), 251-264, 2012

Evaluation of the effect of allergen-specific immunotherapy in atopic dogs using the CADESI-03 scoring system: a methylprednisolone-controlled clinical study

Martin Kovše[1], Petra Zrimšek[2], and Tina Kotnik[3]*

[1]*VP Slovenj Gradec, Veterinarska postaja d.o.o., Slovenj Gradec, Slovenia*

[2]*Clinic for Reproduction and Horses, Veterinary Faculty, University of Ljubljana, Ljubljana, Slovenia*

[3]*Clinic for Small Animal Medicine and Surgery, Veterinary Faculty, University of Ljubljana, Ljubljana, Slovenia*

KOVŠE, M., P. ZRIMŠEK, T. KOTNIK: Evaluation of the effect of allergen-specific immunotherapy in atopic dogs using the CADESI-03 scoring system: a methylprednisolone-controlled clinical study. Vet. arhiv 82, 251-264, 2012.

ABSTRACT

Allergen-specific immunotherapy (ASIT) is a method of specific treatment of atopic dermatitis (AD) which has been used for years in human and veterinary medicine. It is empirically known to be effective in dogs with AD, however, its true effectiveness still seems controversial due to insufficient evidence derived from controlled studies. The purpose of this study was to compare the results of an 8-month ASIT with 2-month symptomatic methylprednisolone treatment in dogs with AD. The third version of Canine Atopic Dermatitis Extent and Severity Index (CADESI-03) was used for the first time for objective evaluation of ASIT efficacy in dogs. 11 atopic dogs, older than 6 months, of various breeds and both sexes, were included in the study. Each dog was initially treated with methylprednisolone over a period of 2 months. After a washout period of 1 month, conventional ASIT with subcutaneous allergen injections was initiated and continued for the next 8 months. CADESI-03 scores were evaluated at regular monthly control visits. In both groups, ≥50% reduction of CADESI-03 score from baseline was recorded in 4/11 dogs (36,4%). A significant effect of ASIT was recorded after 6 months of therapy ($P = 0.032$). Thus, at least a period of 6 months is recommended before assessing treatment efficacy of ASIT. Methylprednisolone proved to be more efficient in controlling pruritus than ASIT. No remarkable changes in blood biochemical parameters were observed in either group. The results of our study suggest that the effect of 8-month ASIT in dogs with AD is comparable to that of 2-month therapy with methylprednisolone. The obvious safety of long-term ASIT additionally supports the more frequent use of this specific therapy in the treatment of canine AD.

Key words: atopic dogs, atopic dermatitis, allergen-specific immunotherapy; hyposensitization, CADESI-03

*Corresponding author:

Tina Kotnik, assistant professor, PhD, DVM, Veterinary Faculty, University of Ljubljana, Gerbičeva 60, 1000 Ljubljana, Slovenia, Phone: +386 1 4779 284; Fax: +386 1 4779 349; E-mail: tina.kotnik@vf.uni-lj.si

ISSN 0372-5480
Printed in Croatia

Introduction

Atopic dermatitis (AD) is a common allergic skin disease of dogs with a high incidence in Europe and other industrialised countries (HILLIER and GRIFFIN, 2001). It has been consensually defined as a genetically-predisposed inflammatory and pruritic allergic skin disease with characteristic clinical features, most commonly associated with a combination of IgE-mediated immediate and late phase reactions to environmental allergens (OLIVRY et al., 2001).

Allergen-specific immunotherapy (ASIT) is currently known as the only specific (causal) treatment of canine AD. ASIT is the practice of administering gradually increasing quantities of an allergen extract to an allergic subject to ameliorate the symptoms associated with subsequent exposure to the causative allergen (BOUSQUET, 1998). The terms desensitization and hyposensitization, which have also been used previously to describe this form of therapy, refer to the primary goal of ASIT, i.e. a reduction or loss of sensitivity in a patient (GRIFFIN and HILLIER, 2001). Allergens are given by subcutaneous injection in increasing doses up to the maintenance dose. No standardized ASIT regimens exist in veterinary medicine. Treatment regimens vary in terms of the type of allergens used, according to the amount of allergens injected and the frequency of injections (SÆVIK et al., 2002). Results of intradermal or serologic allergy tests are used to identify and select allergens for inclusion in ASIT medicament. Treatment recommendations are usually provided by a specialized laboratory that manufactures immunotherapeutic vaccines, making ASIT of atopic dogs readily available for general practitioners.

ASIT has been used for years to treat humans with atopic diseases as well as dogs with atopic dermatitis, but its effectiveness still seems quite controversial. The majority of multiple open studies and a large body of clinical observations suggest that ASIT is effective in controlling the clinical signs of dogs in approx. 70% of patients with AD. Approximately 25% of dogs can have their skin disease controlled with immunotherapy alone, whereas about 40% show a beneficial response together with other forms of treatment (HILL, 2007). There is cumulative clinical evidence of the effect of immunotherapy in both humans and dogs. Recent research in veterinary science provide us with supportive data on immunologic mechanisms: it seems that lower levels of IgE and elevated production of specific IgG1 and IgG4 follows ASIT as a consequence of higher levels of T-regulatory cells that produce large amounts of IL-10 (KEPPEL et al., 2008). In human medicine there have been several changes in immune reactions to allergens already documented and they include a decreased number of inflammatory cells (particularly mast cells, basophils and eosinophils), decline of IgE and increase of IgG1 and IgG4 levels, increased production of IFN-γ and reduced production of IL-4 in T-cell cultures. ASIT is considered safe for long-term use as it rarely causes adverse systemic reactions. The most frequent side

effects are localized swelling, erythema, pain or pruritus at the injection site (GRIFFIN and HILLIER, 2001).

The majority of previous findings regarding the effectiveness of ASIT in atopic dogs were mostly empirical, although this method of treatment of canine AD has been used for more than 50 years. Up to now, studies evaluating ASIT efficacy in dogs have been based either upon a dog owner's subjective perception of health improvement (inquiries), measurement of pruritus scores, a global measure of the veterinarian's perception of the patient's improvement at the end of the study and the patient's need for additional (supportive) therapy or, finally, upon the two CADESI scoring systems. Combined and modified scoring systems have rarely been used.

The third version of Canine Atopic Dermatitis Extent and Severity Index (CADESI-03) is the latest scale for scoring skin lesions in dogs with AD, designed by a committee of the International Task Force on Canine Atopic Dermatitis (ITFCAD) and it is currently recommended as the only properly validated and objective assessment tool for use in clinical trials involving dogs with AD (OLIVRY et al., 2007). To our knowledge it has not yet been used in a clinical trial evaluating the effectiveness of ASIT.

Methylprednisolone was proven to be highly effective for the treatment of allergic dogs, when administered at 0.4-0.8 mg/kg once daily for 7 days, then every other day (GUAGUÈRE, 1996). It may serve as a reliable control drug because of its quick and strong effect on pruritus and other allergy symptoms.

The objectives of this study were to evaluate the effectiveness and safety of 8-month ASIT compared to methylprednisolone treatment in atopic dogs, using CADESI-03 scoring system.

Materials and methods

Inclusion criteria. The study included 11 dogs, older than 6 months (from 12 to 81 months, median 28 months), of various breeds (2 Golden Retrievers, 1 each Labrador Retriever, Fox Terrier, American Staffordshire Terrier, St. Bernard, medium-sized Poodle, Czech Terrier, West Highland White Terrier and 2 mixed-breed dogs), both sexes (6 females and 5 males) and different weights (from 6 to 47 kg, median 25 kg). All dogs had been brought to the Clinic for Small Animal Medicine and Surgery of the Veterinary Faculty of Ljubljana (CSAMS) due to skin problems and were diagnosed with atopic dermatitis.

Prior to the start of the study, microscopic examination of skin scrabs, skin swabs and serologic allergy testing were carried out to exclude parasitic skin diseases, secondary infections and Flea allergy dermatitis. During the study, the dogs were treated with long-acting anti-flea products such as fipronil (Frontline Spot-on; Merial, France) or selamectine (Stronghold; Pfizer Luxembourg SARL, Luxemburg). To exclude the

possible influence of a concurrent food allergy, all dogs were fed an elimination diet during the study period and were not rechallenged until the end. Amongst the diets an individually adjusted home-made diet and Eucanuba FP Dermatosis were preferred. When secondary pyoderma appeared during the study it was controlled by use of oral enrofloxacine (Enroxil; Krka, Slovenija) in a dose of 5 mg/kg SID and/or chlorhexidine shampoo twice weekly (Chlorexyderm forte shampoo, ICF, Italy). *Malassezia* dermatitis was controlled by use of enilconazole dips twice-weekly (Zoniton; Krka, Slovenija). Otitis externa was controlled by Epi-Otic (Virbac Animal Health, France). For each dog, serologic allergy tests (ELISA) for 32 environmental allergens were performed by the Alergovet S.L. laboratory (Madrid, Spain). The clinical diagnosis of atopic dermatitis was based upon the fulfillment of at least 3 major and 3 minor diagnostic criteria proposed by Willemse (WILLEMSE, 1986), amongst them pruritus, chronic dermatitis, elevated allergen-specific IgE and onset of signs before 3 years of age were criteria present in all the dogs included.

Non-inclusion and exclusion criteria. Dogs that fulfilled any of the following criteria could not be enrolled or were excluded from the clinical trial during the study period:

Dogs with inadequately documented history of the disease, previous therapies and their outcome;

Dogs with health conditions that would hinder the evaluation of the disease (like cushing, mastocytoma etc.);

Dogs with serious liver or kidney dysfunction;

Planned or accidental pregnancy;

Dogs in which the elimination diet was not strictly followed;

Dogs treated with the following drugs:

glucocorticoids: less than 4 weeks prior to inclusion,

antihistamines: less than 14 days prior to inclusion,

cyclosporines: less than 30 days prior to inclusion,

essential fatty acid supplements: less than 14 days prior to inclusion,

vitamin E supplements: less than 14 days prior to inclusion,

antipruritic agents such as serotonin reuptake inhibitors (SRI) and selective serotonin reuptake inhibitor (SSRI): less than 14 days prior to inclusion,

previus allergen-specific immunotherapy.

Study design. After being included in the study, all 11 dogs were treated with methylprednisolone (Medrol; Pfizer Luxembourg SARL, Luxemburg in the dose of 0.5 mg/kg PO SID for 5 days, followed by the same dose QOD) over a period of 2 months

(group M). After that, a washout period of 1 month was essential to achieve complete elimination of methylprednisolone influence. A conventional ASIT with subcutaneous allergen injections was then initiated and continued for the next 8 months according to the recommended regimen (Table 1) provided by the Alergovet S.L. laboratory (group I). Allervet™-Ca immunotherapeutic vaccines (Stallergenes S.A. laboratory, Antony Cedex, France) were manufactured according to the results of serologic allergy tests for each dog individually.

CADESI-03 was derived from the previous two CADESI scoring systems and presented in 2007. It was generated by combining an evaluation of the degree of severity (none (0), mild (1), moderate (2-3) and severe (4-5)) for each of the four cardinal signs of canine AD (erythema, excoriation, lichenification and self-induced alopecia) on each of 62 different body areas. The maximum score of CADESI-03 is therefore 1240. CADESI-03 scores were evaluated at regular monthly control visits. To ensure the highest level of reliability and objectivity, a representative photo-table for CADESI-03 scoring system was created prior to the study using photographs of dogs in different clinical stages of atopic dermatitis, examined at CSAMS in the past. A reduction of 50% or higher of CADESI-03 was considered as a major outcome measure of treatment efficacy.

Dermal pruritus was also assessed. The assessment was based upon observations made by the dog owners. Pruritus was evaluated using the visual analog scale, which enabled the owners to record their evaluation by scoring on a 0 to 100 scale. Their evaluation was based on their assessment of intensity, frequency and duration of pruritus. They were instructed to pay attention to the various actions of licking, biting, scratching and rubbing against objects.

The safety of each therapy was assessed monthly by blood tests of liver enzymes (alkaline phosphatase - AP, alanine transferase - ALT) and urea and creatinine as indicators of renal function. Biochemical blood parameters were determined by the Technicon RA-XT biochemical analyzer (Bayer Technicon, Germany).

Table 1. Allergen-specific immunotherapy regimen for the vaccine Allervet™-Ca (Alergovet S.L., Spain, in collaboration with Stallergenes S.A., France)

Week	1	2	3	4	5	6	7	8	9	10	11	13	16	20	24→
Concentration	0,1 IE/mL				1 IE/mL				10 IE/mL						
Dose (mL)	0.2	0.4	0.8	1.0	0.2	0.4	0.8	1.0	0.2	0.4	0.8	1.0	1.0	1.0	1.0→

Statistical evaluation of the results. A small number of tested animals provided a small number of results in one group which were not normally distributed. However, the assumptions of the parametric tests were not satisfied. Therefore we used non parametric tests which do not make any distributional assumptions about the data and are appropriate

for a small number of observations. The analyses in non-parametric tests are performed on the ranks of the observations instead of the original observations.

Within each group, CADESI values recorded at each time point were compared using a nonparametric repeated - measures analysis of variances (Friedman repeated measures analysis of variances on ranks) and Dunn's multiple comparison post-test.

To evaluate whether CADESI scores for each group separately had changed between the start and the selected time point of the study, Wilcoxon signed rank tests were performed for paired samples.

The reduction in CADESI between the start and end point of group M was compared with the reduction of CADESI in group I for each time interval, from the starting point using the Wilcoxon signed rank test.

The Pearson correlation coefficient was used to determine the relationship between the estimated pruritus and CADESI scores, as well as to test the correlation in CADESI scores between both groups at the beginning of the treatment.

The proportion of dogs in each group with a measure of selected biochemical parameters above or below the physiological value was summarized using frequency tables and the groups were compared using Fisher's exact test.

For all statistical analyses, $P<0.05$ was taken to indicate significance.

Statistical analysis was performed using SigmaStat 3.5 (SYSTAT Software Inc.)

Results

Results of serologic allergy testing performed by Alergovet laboratory (Madrid, Spain) showed that 7/11 dogs (63.6%) had been sensitized against the group of storage mites and the house dust mite *Dermatophagoides farinae*. These were therefore recognized as the most frequent allergens responsible for the development of atopic disease in our dogs. In the studied dogs, three dogs (27.3%) were sensitized at the same time against plant allergens (pollens of grasses, trees and weeds). Four dogs (36.4%) were sensitised against plant allergens alone. Three of them lived exclusively in an urban environment (numbers 8, 10 and 11) and the fourth (number 7) lived most of the time in an urban environment. The highest number of allergens identified in one dog was 10, and the lowest 2.

Concurrent events observed during methylprednisolone therapy were polyuria/polydypsia (27.3%), otitis externa (18.2%), *Malassezia* dermatitis (18.2%), respiratory symptoms (18.2%), bacterial pyoderma (9.1%) and gastrointestinal problems (9.1%).

The most common concurrent event noticed during ASIT was local erythema and itching at the site of the allergen injection, noticed in 72.7% of dogs. Both signs typically lasted for a short period of time and usually disappeared one day after injection. These signs no longer appeared in any of the dogs when the maintenance dose of ASIT vaccine

had been reached. Other concurrent events noticed during ASIT were conjunctivitis (45.5%), otitis externa (36.4%), gastrointestinal problems (36.4%), bacterial pyoderma (27.3%), generalized pruritus with erythema 18.2%), respiratory symptoms (9.1%) and other (9.1%). Some of them were mild and therefore only observed (like conjunctivitis, gastrointestinal problems and respiratory symptoms) while others were treated (see inclusion criteria). Eight dogs undergoing ASIT (72.7%) therefore required additional topical therapy, such as ear drops (36.4%), antibiotic creams/ointments or antipruritic shampoos (27.3%). Two dogs required systemic antipruritic therapy (glucocorticoids and/or antihistamines) and were therefore excluded from the study.

Fig. 1 shows that a ≥50% reduction of the total CADESI-03 score from the baseline was achieved in four dogs (36.4%) treated with methylprednisolone. In two patients, such a reduction was already achieved after the first month of methylprednisolone therapy, whereas in the other two, two months of therapy were needed for such a result to be achieved. Six dogs experienced a <50% reduction of total CADESI-03 scores after two months of therapy, whereas the clinical state of one dog even deteriorated after two months of therapy. The CADESI-03 scores became significantly different from the baseline scores after 2 months of methylprednisolone therapy (P = 0.015).

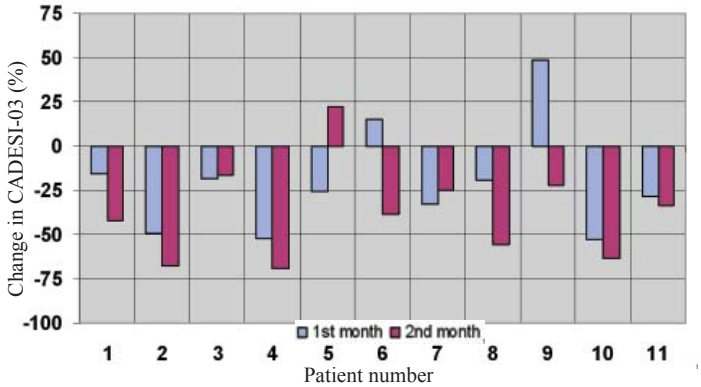

Fig. 1. Changes in CADESI-03 scores (%) during the period of methylprednisolone therapy (group M)

Fig. 2 shows that a ≥50% reduction of total CADESI-03 score from the baseline was achieved in four dogs (36.4%) treated with ASIT. Such a reduction was recorded after 3 months of ASIT in two dogs and after 6 months of ASIT in another two. Patients 2 and 5 required systemic antipruritic therapy (glucocorticoids and/or antihistamines) and were excluded from the study. The scores became significantly different from the baseline scores after 6 months of ASIT (P = 0.032).

Comparison of total CADESI-03 scores after the 1-month washout period (prior to ASIT) with the baseline (prior to methylprednisolone therapy) showed a significant positive correlation ($r = 0.75$, $P<0.01$). Additional statistical analysis did not reveal significant differences between total CADESI-03 scores prior to methylprednisolone therapy and those prior to ASIT ($P = 0.649$, data not shown).

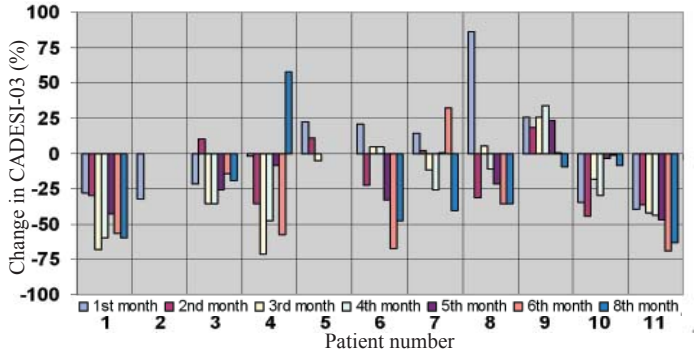

Fig. 2. Changes in CADESI-03 scores (%) during the period of ASIT (group I)

From Fig. 1 and Fig. 2 we can observe that in as many as five studied dogs (45.5%), a larger reduction in total CADESI-03 score was recorded after 8 months of ASIT than after 2 months of methylprednisolone therapy.

Fig. 3 compares the mean changes of CADESI-03 between both groups in relation to months of therapy. The fastest effect of methylprednisolone was recorded after the first month of therapy, whereas ASIT caused the most rapid improvement after the second month of therapy.

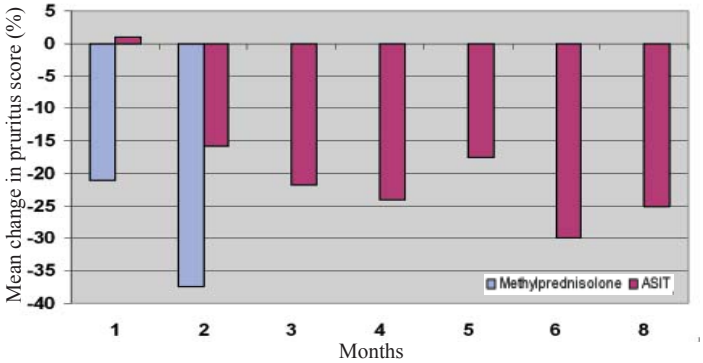

Fig. 3. Mean changes in CADESI-03 scores (%) in both groups

The effect of ASIT was comparable to that of 2-month methylprednisolone therapy after 3 months of therapy, as there was no significant difference between improvements in total CADESI-03 scores caused by both therapies at that time (P = 0.492).

Fig. 4 compares mean changes in pruritus score between both groups in relation to months passed. The quick and strong favorable effect of methylprednisolone on pruritus was evident, whereas the mean reduction in estimated pruritus score stagnated at approximately -20% during ASIT.

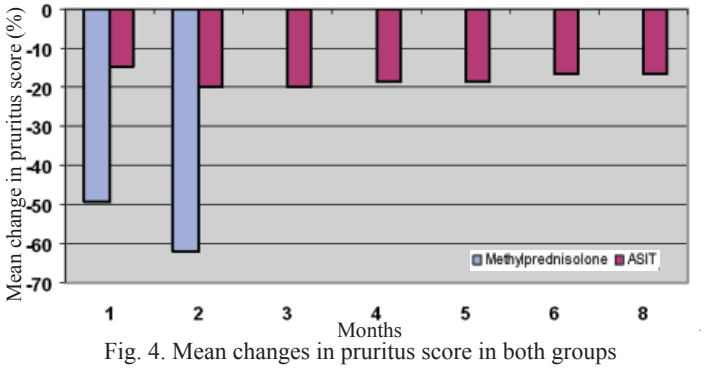

Fig. 4. Mean changes in pruritus score in both groups

Comparison of CADESI-03 scores with estimated pruritus scores revealed a significant positively correlation (r = 0.564, P<0.01) in the same therapy group.

No remarkable changes in blood biochemical parameters (urea, creatinine, AP, ALT) were seen in either group (data not shown). The Fisher exact test revealed no statistically significant differences between urea, creatinine, AP and ALT (P = 0.745, 1,000, 1,000 and 1,000, respectively) in either of the groups compared to the baseline levels.

Discussion

The study included 11 atopic dogs. The nature of the study demanded regular and relatively long monitoring of patients treated with ASIT. For this purpose, the design of the study was rationalized and was based on a single group of dogs which served as a control group (group M, treated with methylprednisolone for 2 months) at the beginning of the research, and then, following a 1-month washout period, also as a test group (group I, treated with ASIT for 8 months). The main advantage of such a single research group was the exclusion of individual differences between two different samples of animals (upon which the majority of known similar studies has been based) and the elimination of the possible influence these differences might have on the objectivity of comparative analysis of groups (NOURBAKHSH and OTTENBACHER, 1994). On the other hand, non-

simultaneous comparison of two different therapies in two different periods could be characterized as the main negative aspect of this study design. The probable reason for the worsening of CADESI scores during methylprednisolone treatment in three dogs (numbers 5, 6 and 9, see Fig. 1) could be contamination of dry foods with storage mites. The same may be true for exacerbation during ASIT in the dogs numbered 4, 6, 7 and 9 (see Fig. 2). Since the effect of immunotherapy in storage mite hypersensitive dogs remains unclear they should be fed exclusively homemade elimination diets.

Serologic allergy tests were performed in order to select allergens for production of immunotherapeutic vaccines. When compared to individual dog histories, the results showed that plant allergen sensitizations were more frequent in dogs that lived in an urban environment. This phenomenon has already been described in human allergology (D'AMATO, 2002) and may reflect a response otherwise described in flea allergy dermatitis (FAD) in dogs. It has been shown that FAD develops in dogs that are only intermittently exposed to fleas (SCOTT et al., 2001). Something similar may be true for plant allergens.

The washout period of 1 month was essential to achieve complete elimination of the influence of methylprednisolone. The duration of washout period was determined on the basis of recent studies that recommend a washout period of at least three weeks for peroral treatment with glucocorticoids (BEALE, 2006; OLIVRY et al., 2002). Total CADESI-03 scores did not differ prior to both therapies ($P = 0.649$), therefore we can conclude that the chosen washout period was long enough for groups M and I to be independent.

The percentage of study subjects achieving reduction of ≥50% of the CADESI score (partial remission) has been determined as one of the clinically relevant outcome measures of treatment efficacy in dogs with AD (OLIVRY et al., 2007). Many times higher percentages (59-64%) of ASIT treated dogs have been reported to achieve ≥50% reduction of lesion scores (WILLEMSE et al., 1984; NUTTALL et al., 1998; SCHNABL et al., 2006). Unfortunately data gained by the use of different scoring systems are hardly comparable. Therefore we decided to use methylprednisolone treatment as the standard of care. This drug is generally known as being highly effective and exhibits a short elimination half-life that allows alternate day prescription modalities (GUAGUÈRE et al., 1996). The two-month methylprednisolone treatment in our study showed similar efficacy to ASIT, lowering the CADESI-03 score by ≥50% in the same number of dogs (4/11 = 36,4%). The same proportion of ≥50% reductions of CADESI-03 with ASIT was reported by Mueller in 2005 (MUELLER et al., 2005). Since the major improvement of clinical signs and the significant effect of ASIT were recorded after 6 months of therapy, this period can be recommended as the shortest treatment period after which ASIT efficacy may be critically assessed. For comparison, Willemse proposed a critical period of 9 months to objectively evaluate ASIT efficacy (WILLEMSE et al., 1984).

The estimated pruritus score is a parameter which indicates treatment efficacy much more rapidly than any lesion score. It has been shown that 6-week treatment of canine AD is too short to achieve complete remission of certain skin lesions (e.g. lichenification) that require a longer period to be cured (OLIVRY et al., 2002). On the other hand, the pruritus score is more subjective than the CADESI lesion score and we need to evaluate it more rigorously. Some authors propose that ≥70% of study subjects need to achieve ≥50% reduction of pruritus as one of the standard outcome measures of treatment efficacy for canine AD (BEALE, 2006). In the ASIT group, ≥50% reduction of pruritus was recorded in 55.6% (data not shown) of dogs, but not in all periods of treatment, as the treatment with ASIT was much longer than that with methylpednisolone and the dogs were more susceptible to seasonal and environmental changes in allergen concentration. A moderate response of pruritus to ASIT was expected and is comparable with other recent studies (COLOMBO et al., 2005). Since treatment with methylprednisolone is considered to be one of the most efficient antipruritic therapies, high percentages of ≥50% reduction of pruritus were expected. After 2 months methylprednisolone therapy as many as 90.9% of dogs in our study experienced ≥50% reduction of pruritus (data not shown).

A comparable degree of correlation between pruritus and CADESI-03 scores was reported by the authors who validated the CADESI-03 system (OLIVRY et al., 2007). According to these results we can conclude that the lesion score in our study efficiently followed the pruritus score.

None of the previous studies described any significant changes in blood biochemical parameters in patients undergoing ASIT and this was also confirmed by the results of the present study. On the other hand, a 2-month and alternate-day treatment with low doses of methylprednisolone was short and safe enough for the patients not to exhibit the changes in blood biochemical parameters associated with long-term glucocorticoid therapy. We can therefore conclude that 8-month ASIT is as safe as 2-month methylprednisolone treatment.

Conclusion

In conclusion, the results of our study suggest that the effect of 8-months ASIT in dogs with AD is comparable to that of 2-months therapy with methylprednisolone. Methylprednisolone is much more effective in controlling pruritus than ASIT, however the effects of ASIT and methylprednisolone in controlling skin lesions associated with CAD are totally comparable. The obvious safety of long-term ASIT additionally supports the more frequent use of this specific therapy in the future treatment of canine AD.

Acknowledgements

We would like to acknowledge the laboratory work of Alenka Nemec Svete and Aleksander Jenko, as well as the help and support of the other staff members of the Clinic for Small Animal Medicine and Surgery. The study was supported by Ministry of Research of the Republic of Slovenia.

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Received: 13 April 2011
Accepted: 5 December 2012

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SAŽETAK

Alergen specifična imunoterapija (ASIT) metoda je specifičnoga liječenja atopijskog dermatititsa (AD) koja se godinama primjenjuje u humanoj i veterinarskoj medicini. Iskustveno je poznato da je učinkovita u pasa s AD, ali je njezina učinkovitost još uvijek prijeporna, jer nema dovoljno dokaza proizašlih iz kontroliranih istraživanja. Svrha ovoga istraživanja bila je usporediti rezultate 8-mjesečne ASIT s rezultatima dvomjesečnoga simptomatskoga liječenja AD pasa metilprednizolonom. Treća verzija određivanja stupnja i indeksa jačine atopijskoga dermatitisa u psa (engl. Canine Atopic Dermatitis Extent and Severity Index (CADESI-03)) prviput je bila rabljena za objektivnu prosudbu učinkovitosti ASIT u pasa. Jedanaest atopičnih pasa, starijih od šest mjeseci, različitih pasmina i različita spola bilo je uključeno u ovo istraživanje. Svaki je pas početno bio liječen prednizolonom tijekom dva mjeseca. Nakon jednomjesečne stanke, započeta je uobičajena ASIT sa supkutanom primjenom alergena u trajanju od sljedećih osam mjeseci. CADESI-03 bodovanje bilo je vrednovano prilikom redovitih mjesečnih kontrolnih pregleda. U obje skupine ustanovljeno je smanjenje CADESI-03 bodova ≥50% od bazičnoga u 4 od 11 pasa (36,4%). Značajni učinak ASIT-a bio je ustanovljen nakon šest mjeseci liječenja ($P = 0,032$). Stoga se procjena učinkovitosti ASIT-a može dati tek nakon liječenja od najmanje šest mjeseci. Metilprednizolon je bio učinkovitiji za suzbijanje svrbeža od ASIT-a. Nije bila ustanovljena značajna razlika u biokemijskim pokazateljima krvi među promatranim skupinama. Rezultati ovoga istraživanja pokazuju da je učinak 8-mjesečne alergen specifične imunoterapije u pasa s atopijskim dermatitisom jednak onome kod

dvomjesečnoga liječenja prednizolonom. Očita sigurnost dugotrajne ASIT dodatna je potpora sve češćoj upotrebi toga specifičnoga liječenja atopijskoga dermatitisa pasa.

Ključne riječi: atopijski psi, atopijski dermatitis, alergen specifična imunoterapija, hiposenzibilizacija, CADESI-03