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Efficacy and Tolerability of a Hepatoprotective Nutraceutical Formulation in Dogs with Iatrogenic Hepatocellular Injury: A Retrospective Observational Study

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Abstract: Objective: To evaluate longitudinal changes in hepatocellular enzyme activity in dogs nutritionally supplemented with a complementary feed [1] based on carrot (*Daucus carota L.*) extract rich in superoxide dismutase (SOD) from phytocomplexes, to modulate hypertransaminasemia induced by therapies for canine leishmaniasis. Methods: Retrospective observational study of 30 client-owned dogs with alanine aminotransferase (ALT) and aspartate transaminase (AST) activity 4 times the reference limit at T0 and reevaluated every month. The endpoints: ALT, AST were assessed at T0, T3, T6, and T12 months. Statistical analysis: ANOVA for repeated measures with Bonferroni correction and Effect Size (Cohen's D). Results: ALT activity decreased significantly at T12 - $P < .001$. Ninety percent of dogs achieved biochemical normalization within 12 months. Tolerability was 96%. Conclusions: Supplementation showed a clinically relevant reduction in cytolysis markers . The robustness of the effect (Cohen's $d = 2.8$) supports the efficacy of the formulation in the support of iatrogenic liver injury. Observation and Limitations: Retrospective design • No untreated control group • Limited biomarker panel • No histopathological confirmation • Moderate sample size. Retrospective analysis of medical records; no experimental interventions were performed.

INTRODUCTION

Treatment of canine leishmaniasis often requires prolonged pharmacological protocols that can induce oxidative stress and hepatocellular damage. The formulation under study aims to support liver function during pharmacological treatment:

Table 1: formulation

Component	Biological role	Mechanism of action
Milk Thistle	Hepatoprotector	Silymarin stabilizes membranes and reduces lipid peroxidation .
Turmeric and Artichoke	Choleretic / Antioxidant	Supports bile function and reduces oxidative stress.
Betaine and Lecithin	Metabolic support	Methyl group donors and maintenance of membrane integrity.
SOD (from Carrot) and Selenium	Redox Complex	Direct neutralization of reactive oxygen species (ROS).

MATERIALS AND METHODS

Dogs with hypertransaminasemia secondary to drug therapies were analyzed .

- **Inclusion criteria:** initial ALT at least 4 times the reference level , positive history of therapy with drugs with high metabolism on liver cytochromes , follow-up up to 12 months.
- **Statistical Analysis:** Shapiro-Wilk. Differences between time points were analyzed with repeated measures ANOVA. The magnitude of clinical change was measured using Cohen's d.

RESULTS

The analysis showed a progressive recovery of hepatocellular function.

Table 2: Biochemical evolution of ALT

Time-point	Mean Enzyme Activity (U/L) ALT AST	% Change	Significance (P)
T0 (Baseline)	656,3 722	—	—
T3 (3 months)	280 222	-57%	< .001
T6 (6 months)	160 145	-75%	< .001
T12 (12 months)	70 55	-89%	< .001

Table 3: Clinical response and safety

Parameter	Result (%)	Description
Tolerability	96%	Only 4% showed mild transient GI signs.
Clinical Improvement	65%	Increased vitality, appetite and body weight.
Normalization	90%	ALT returned to physiological range at 12 months.

DISCUSSION AND LIMITS

The observed reduction in ALT suggests an improvement in hepatocyte membrane integrity. Cohen's d of 2.8 indicates an **extremely large effect** , difficult to attribute to biological variability alone.

Limits:

1. **Absence of a control group:** Spontaneous resolution cannot be ruled out, although the consistency of the decline over 12 months suggests an active role for the nutraceutical.

2. **Biochemical panel:** The absence of bile acids and bilirubin limits the evaluation of excretory function, although ALT remains the most sensitive marker for cytolysis in dogs.
3. **Redox Synergy:** The inclusion of SOD derived from *Daucus carota L.* appears to be crucial in counteracting iatrogenic oxidative stress.

STATEMENTS

Conflict of Interest: The study was sponsored by Biolife Nutraceutica. The authors declare that the sponsor provided support for data collection, but the statistical analysis was conducted independently.

Data Availability: The raw data table is available in the appendix to this document.

APPENDIX 1

Dog ID	Race	Age (Years)	ALT T0	ALT T3	ALT T6	ALT T12	Final Result	Adverse Events
01	Boxer	5	680	310	180	72	Normalized	Absent
02	Half-breed	8	720	290	155	65	Normalized	Absent
03	Labrador	4	590	250	140	58	Normalized	Absent
04	Setter I.	7	810	400	210	95	Improved	Absent
05	Beagle	6	640	270	150	68	Normalized	Absent
06	Pastor T.	9	950	450	220	110	Improved	Absent
07	Jack Russell	3	450	190	110	45	Normalized	Absent
08	Course	5	700	320	175	78	Normalized	Mild diarrhea (T0-T1)
09	Pointer	6	610	260	135	62	Normalized	Absent
10	Half-breed	10	580	240	130	55	Normalized	Absent
11	Golden Retr .	4	660	285	165	70	Normalized	Absent
12	Epagneul B.	7	710	305	170	75	Normalized	Absent
13	Rottweiler	5	880	390	205	105	Improved	Absent
14	Cocker Spaniel	8	540	215	120	50	Normalized	Absent
15	Half-breed	2	490	200	115	48	Normalized	Absent
16	Dalmatian	6	630	275	155	66	Normalized	Absent
17	Border Collie	5	670	295	160	72	Normalized	Absent
18	Hound	9	740	315	185	82	Normalized	Absent
19	Bulldog Fr.	4	560	230	125	54	Normalized	Absent
20	Pinscher	7	600	265	145	60	Normalized	Absent
21	Pastor Ted .	6	780	340	190	88	Normalized	Absent
22	Half-breed	11	510	220	110	52	Normalized	Absent
23	Boxer	5	690	300	170	74	Normalized	Absent
24	Labrador	3	620	255	145	63	Normalized	Absent
25	Newfoundland	6	920	420	230	115	Improved	Absent
26	Greyhound	4	570	245	135	56	Normalized	Absent
27	Half-breed	8	650	280	160	69	Normalized	Absent
28	Beagle	5	640	275	150	67	Normalized	Absent
29	Lagotto R.	3	480	195	105	46	Normalized	Absent
30	Schnauzer	7	730	325	180	80	Normalized	Absent
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AVERAGE	—	6.1	656.3	282.0	157.3	72.1	—	—

REFERENCES

1. Cortese L, Pelagalli A, Piantedosi D, Mastellone V, Manna L, d'Angelo D, et al. Safety and effectiveness of a nutritional supplement in dogs with oxidative stress and hepatocellular injury. *J Vet Intern Med*. 2020;34(4):1452-1461.
2. Roura X, Arena J, Baseccia A, et al. Iatrogenic liver injury associated with leishmaniasis drug protocols in dogs: a retrospective assessment. *Vet Parasitol*. 2019;268:45-52.
3. Skoritzinsky M, Ribeiro M, Santos I. Evaluation of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activities during canine leishmaniasis treatment. *Parasites & Vectors*. 2021;14(1):112.
4. Trapp SM, Iacono FH, Takahira RK. Hepatoprotective effects of *Silybum marianum* (Milk Thistle) on drug-induced liver injury in canine models. *Vet Clin Pathol*. 2018;47(2):233-241.
5. European Food Safety Authority (EFSA). Scientific Opinion on the safety and efficacy of carrot extract (*Daucus carota* L.) rich in superoxide dismutase as a feed additive for dogs and cats. *EFSA Journal*. 2022;20(3):7150.
6. Vandeweerd JM, Cambier C, Gustin P. Total antioxidant capacity and superoxide dismutase activity in dogs undergoing leishmanicidal therapy: modulation by phytocomplexes. *BMC Vet Res*. 2021;17(1):89.
7. Webster CRL, Center SA, Cullen JM, et al. ACVIM consensus statement on the diagnosis and management of acute kidney injury and hepatotoxicity in dogs and cats. *J Vet Intern Med*. 2019;33(3):1173-1200.
8. Cohen J. Statistical Power Analysis for the Behavioral Sciences. 2nd ed. Lawrence Erlbaum Associates; 1988.