CHANGES IN HEPATIC AMINOTRANSFERASE ACTIVITY (ALT AND AST) IN COMPANION ANIMALS FOLLOWING THE USE OF A PRODUCT CONTAINING A BLEND OF PLANT EXTRACTS: A CLINICAL PRACTICE REPORT

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ABSTRACT

Herbal blends with antioxidant/hepatoprotective activity—especially milk thistle derivatives—are widely used in dogs and cats, and interest in multi-component formulas (e.g., artichoke, dandelion, vitamins) is growing. Quantitative evidence from routine practice remains limited. To evaluate changes in ALT and AST with oral supplementation containing plant extracts (milk thistle, artichoke, dandelion) plus co-ingredients (lecithin, vitamin E, B-vitamins, MSM). Ten companion animals (9 dogs, 1 cat) had ALT/AST measured at baseline and at ~30 and ~60 days after starting once-daily supplementation (5 ml/10 kg). Results were summarized as medians; paired Wilcoxon tests were used.

After approximately 30 days, ALT activity declined in all 10 animals (median 337.5 → 77.5 U/L; median relative change −59.8%; p = 0.002). At ~60 days (data available for 7 animals), the median ALT was 61.0 U/L (−71.3% vs. baseline; −12.2% vs. day 30; p = 0.047 vs. day 30). AST also decreased in all 10 animals after ~30 days (81.5 → 29.5 U/L; −43.2%; p = 0.002), and in those with measurements available at ~60 days, values remained low (23.0 U/L; p = 0.469 vs. day 30). Improved appetite and stool consistency were also frequently noted in clinical records. In this clinical case series, 60 days of daily supplementation with a plant-extract blend plus vitamins/MSM was associated with marked reductions in ALT and AST. Decreases were evident by ~30 days, with continued ALT decline by ~60 days. These exploratory findings warrant further, more standardized investigations.

INTRODUCTION

The liver is the primary organ responsible for maintaining the body's antioxidant balance, including the production of glutathione—a compound that helps neutralize harmful free radicals within cells. Disruption of the redox balance and accompanying inflammation contribute to the progression of various hepatic disorders in animals, as evidenced, among other markers, by elevated serum aminotransferase activity (ALT – alanine aminotransferase, AST – aspartate aminotransferase). In dogs and cats, both acute and chronic liver and biliary tract diseases are relatively common. Their etiology is diverse, and treatment strategies depend on multiple factors, including the cause, disease duration, species, and clinical condition of the patient. In clinical practice, anti-inflammatory and hepatoprotective drugs, immunosuppressive agents, and antifibrotic therapies are among the approaches used. In the context of companion animal veterinary care, there is growing interest in supportive interventions with antioxidant and hepatoprotective potential that may complement standard dietary and pharmacological management (Martello et al. 2023, Marchegiani et al. 2020).

Numerous complementary feeds are available on the market to support liver function in dogs and cats, typically containing plant extracts and nutraceutical ingredients. Extracts from milk thistle

(*Silybum marianum*), particularly its flavonolignan fraction known as silymarin (with silybin as its principal component), have long been recognized for their antioxidant, anti-inflammatory, antifibrotic, and choleretic properties (Martello et al. 2023, Marchegiani et al. 2020, Biasbetti et al. 2018, Gogulski et al. 2021, Balouei et al. 2024, Giannetto et al. 2022). In studies involving dogs, dietary supplementation with silybin-containing products has been associated with reductions in ALT, AST, and GGT activities, and modifications in oxidative stress biomarkers and hepatocyte-related microRNA expression (Gogulski et al. 2021, Giannetto et al. 2022). More recently, complex formulations have been introduced that combine silymarin with other antioxidants and vitamins—such as vitamin E and B-complex vitamins—and even, in some cases, prebiotic or probiotic components; these products have demonstrated concurrent improvement in biochemical parameters without adverse effects on digestibility (Martello et al. 2023, Marchegiani et al. 2020, Balouei et al. 2024, Giannetto et al. 2022).

Other hepatoprotective ingredients include globe artichoke (*Cynara scolymus*) and dandelion (*Taraxacum officinale*), which are sources of polyphenols (e.g., cynarin, luteolin) known for their antioxidant and choleretic effects. Although less extensively studied in dogs than milk thistle, these plants are sometimes used in multicomponent formulations (Marchegiani et al. 2020, Salekzamani et al. 2019, Devaraj 2016). Such products may also include vitamin E (a potent antioxidant), vitamins B6 and B9 (involved in sulfur metabolism and glutathione regulation), methylsulfonylmethane (MSM; with potential anti-inflammatory effects), and lecithin (a source of membrane phospholipids supporting lipid metabolism in hepatocytes) (Balouei et al. 2024, Giannetto et al. 2022). These ingredients are selected to combine antioxidant activity with potential support for hepatic regeneration and detoxification pathways.

Although controlled trials have shown that complementary feeds containing silybin and other antioxidants can reduce hepatic enzyme activity in dogs, there remains a lack of quantitative data documenting the speed and magnitude of changes in these parameters under real-world clinical conditions, where concurrent dietary modifications or primary treatment protocols may be in place. The aim of the present study is to help fill this gap by providing a consistent, numerical account of ALT and AST dynamics in a series of patients supplemented with a product combining milk thistle, artichoke, and dandelion extracts, along with vitamins and MSM. An added value of this report is the inclusion of two timepoints (~30 and ~60 days), enabling comparison with the temporal dynamics reported in experimental studies.

MATERIALS AND METHODS

This clinical case series included ten companion animals under routine veterinary care at a single facility; no procedures beyond standard diagnostic or therapeutic practice were performed. In accordance with local regulations, this non-interventional use of routinely collected clinical data did not require approval by a local animal ethics committee; owners provided verbal consent for the use of anonymized records, and animal welfare standards were fully respected throughout. Cases were included if, during the course of standard clinical management, the veterinarian initiated dietary support with a complementary feed containing plant extracts, and if routine ALT and AST measurements (quantitative, U/L) were available. The most common complaints reported by caregivers included gastrointestinal symptoms (diarrhea, reduced appetite, occasional vomiting), while in a few cases, hepatic pain or suspected intoxication was noted. All biochemical analyses were conducted by the same laboratory according to its standard procedures.

The complementary feed used in this observation was a product containing extracts of milk thistle (*Silybum marianum*), artichoke (*Cynara scolymus*), and dandelion (*Taraxacum officinale*) (TSC™ complex), along with lecithin, vitamins, zinc, and methylsulfonylmethane (MSM) (Anirevil™ Protect,

Biovico, Gdynia). The composition per 5 ml unit was: TSC™ 204 mg, lecithin 102 mg, vitamin E 34 mg, MSM 25.5 mg, vitamin B6 1.2 mg, vitamin B9 1.0 mg, and zinc 0.12 mg. The product was administered once daily for 60 days at a daily dose of 0.5 ml per kg of body weight. Caregivers received detailed instructions on how to administer the product. Animals' dietary management was individualized in accordance with ongoing clinical care. Most patients received liver-supportive diets, while the cat received a gastrointestinal-support formula.

ALT and AST were measured at three timepoints consistent with routine monitoring: baseline before introducing the complementary feed (V1), after ~30 days of supplementation (V2), and after ~60 days (V3). In addition to biochemical data, medical records included brief clinical observations reported by caregivers (e.g., appetite, stool consistency, other remarks). Changes in ALT and AST activity between visits were assessed and expressed both in absolute values (U/L) and as a percentage relative to baseline. The primary endpoint was defined as the change in ALT from V1 to V3. Secondary endpoints included changes in AST and changes in both enzymes from W1 to W2. Given the observational nature of the data, no causal hypotheses were formulated; the goal was to describe the direction and magnitude of changes under real-world outpatient conditions.

Comparisons were made only for patients with results available at both timepoints being analyzed (V2–V1, V3–V1, V3–V2). Missing values were excluded from the analysis. No power calculations were performed due to the small sample size. Data are presented as medians with interquartile ranges (IQR); minimum–maximum values were also provided where useful. For within-subject comparisons (V2 vs V1, V3 vs V1, V3 vs V2), the Wilcoxon signed-rank test (two-sided) was applied at a significance level of $\alpha = 0.05$. Calculations were performed in Python (pandas, NumPy; SciPy – Wilcoxon function), and exact two-sided p-values were reported to three decimal places. Due to the limited number of cases and analyzed parameters, no correction for multiple comparisons was applied; test results were interpreted as supportive.

RESULTS

A total of 10 animals (9 dogs, 1 cat) were included in the analysis. Baseline and approximately day-30 measurements were available for all patients, whereas data from approximately day 60 were available for 7 out of 10 animals; the remaining patients did not return for the follow-up visit. At baseline, median (IQR) enzyme activities were as follows: ALT 337.5 U/L (173.8–494.0; min–max 107–908; n = 10) and AST 81.5 U/L (61.0–109.3; 28–275; n = 10) (Table 1). For clinical context, the following typical reference ranges were used: for dogs, ALT 10–100 U/L and AST 10–50 U/L; for cats, ALT 20–100 U/L and AST 10–60 U/L. The baseline median values in the evaluated sample clearly exceeded the upper limits of these reference intervals, particularly for ALT.

Table 1. ALT and AST – summary values at timepoints.

Parameter	V1 (n=10)	V2 ~30 d (n=10)	V3 ~60 d (n=7)
ALT (U/L) **median [IQR]**	337,5 **[173,8-494,0]**	77,5 **[48,2-199,5]**	61,0 **[44,5-71,5]**
mean ± SD	**383,4 ± 262,4**	**144,8 ± 133,6**	**70,4 ± 42,0**
AST (U/L) **median [IQR]**	81,5 **[61,0-109,2]**	29,5 **[24,2-38,2]**	23,0 **[22,0-28,0]**
mean ± SD	**96,2 ± 68,9**	**38,6 ± 26,6**	**24,3 ± 7,7**

After approximately 30 days, a decrease in ALT activity was observed in all 10 patients: the median dropped to 77.5 U/L (IQR 48.3–199.5; range 35–397; n = 10). The median relative change (V2 vs V1) was −59.8% (IQR −74.4 to −50.3). The within-subject difference between visits was statistically significant according to the Wilcoxon signed-rank test (p = 0.002) (Figure 1 and Figure 2). AST levels also decreased in all 10 patients after ~30 days: the median was 29.5 U/L (IQR 24.3–38.3; range 9–91; n = 10), with a median relative change of −43.2% (IQR −75.3 to −26.7); p = 0.002 for V2 vs V1 (Figure 3 and Figure 4).

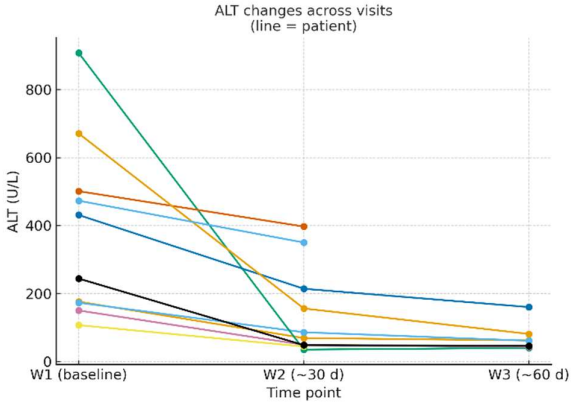

Figure 1. Individual changes in ALT activity at three timepoints: V1 – before starting supplementation, V2 – after ~30 days, V3 – after ~60 days. Missing data at V3 reflect patients who did not return for follow-up.

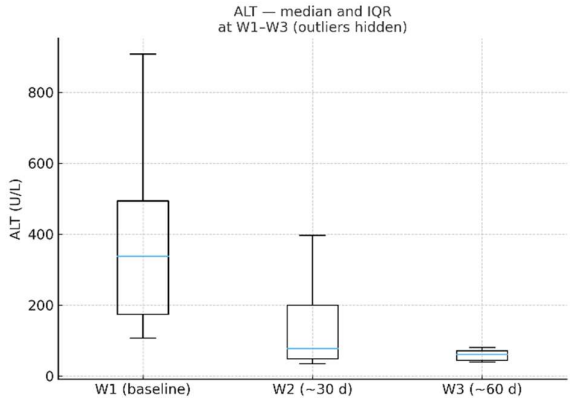

Figure 2. ALT levels at V1–V3 presented as a summary plot showing the median (line inside box), interquartile range (IQR; box boundaries), and range excluding outliers.

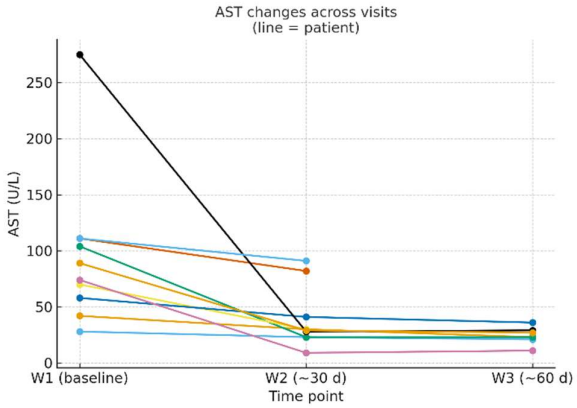

Figure 3. Individual changes in AST activity at three timepoints: V1 – before starting supplementation, V2 – after ~30 days, V3 – after ~60 days. Missing data at V3 reflect patients who did not return for follow-up.

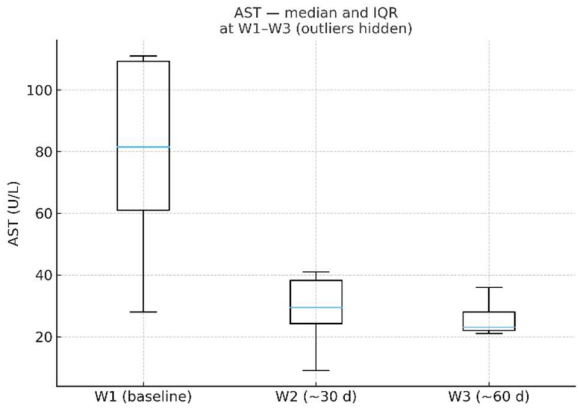

Figure 4. AST levels at V1–V3 presented as a summary plot showing the median (line inside box), interquartile range (IQR; box boundaries), and range excluding outliers.

In the subgroup with available data at ~60 days, ALT values remained low, with a further slight decrease compared to ~30 days in 6 out of 7 animals: the median was 61.0 U/L (IQR 44.5–71.5; range 40–160; n = 7). These values were significantly lower than at baseline (p = 0.016 for V3 vs V1) and slightly, yet significantly, lower than at ~30 days (p = 0.047 for V3 vs V2). The median relative change was −71.3% (IQR −84.5 to −64.8) from baseline, and −12.2% (IQR −27.2 to −7.2) compared to ~30 days (Figures 1 and 2, Table 1). AST levels at ~60 days also remained low: 23.0 U/L (IQR 22.0–28.0; range 11–36; n = 7), significantly lower than baseline (p = 0.016 for V3 vs V1), although the difference compared to ~30 days did not reach statistical significance (p = 0.168; median relative change −6.9%, IQR −10.4 to 1.8). Four of seven animals showed further reductions in AST values between ~30 and ~60 days (Figures 3 and 4).

Taken together, the effect size was substantial: the median ALT reduction was ~60% after ~30 days and ~71% after ~60 days. For AST, the median reduction at ~30 days was ~43%, while the median value of 23.0 U/L at ~60 days corresponded to an overall decrease of ~70% from baseline. After approximately 60 days, ALT values were within the typical reference range (≤100 U/L) in 6 out of 7 animals, and AST levels were within the respective species-specific reference ranges in all 7 of 7 animals (dog: 10–50 U/L; cat: 10–60 U/L). Caregiver-reported clinical observations were consistent

with the direction of biochemical changes: improvements in appetite and normalization of stool consistency were frequently noted.

DISCUSSION

In the presented case series, a consistent direction of changes was observed: after approximately 30 days of dietary supplementation, most patients demonstrated a clear reduction in ALT and AST activity. When the administration of the product was extended to approximately 60 days, low AST activity was maintained, accompanied by a modest additional decrease in ALT. This biphasic response—an initial improvement in the first month followed by a sustained effect in the second—is consistent with clinical experience in managing mild to moderate hepatopathies, where a reduction in hepatocellular injury triggers and hepatoprotective support initially leads to a decline in transaminase levels (ALT/AST), followed by their stabilization within lower ranges. This progression aligns with findings from studies on supplements based on silybin/silymarin: in dogs with liver disease, significant reductions in ALT/AST were observed by approximately day 28 and sustained through day 35, while another study reported similar improvements between days 20 and 30 of supplementation (Giannetto et al. 2022).

With regard to reference values, after ~60 days most patients achieved ALT levels within the normal range (6/7), and AST was within range for all (7/7); in only one case, ALT remained slightly above the upper limit (160 U/L), despite a marked improvement from the baseline value (431 U/L). From a biological perspective, these findings are supported by published evidence on products with antioxidant and choleretic properties. In studies involving dogs with liver disease, complementary feeds containing silybin/silymarin and other antioxidants led to decreased hepatic enzyme activity, increased markers of antioxidant defense (e.g., erythrocyte glutathione), and reduced expression of miR-122, a recognized indicator of hepatocyte injury (Martello et al. 2023, Gogulski et al. 2021, Giannetto et al. 2022). The complementary feed used in this observation contained plant extracts—milk thistle (a source of silybin), artichoke, and dandelion—known for their antioxidant and choleretic properties (Balouei et al. 2024). It also included ingredients supporting membrane homeostasis and redox balance (lecithin, vitamin E, B vitamins, zinc, MSM). Due to the compound nature of the formulation, the effect cannot be attributed to a single component, but the observed trend (rapid transaminase reduction) is consistent with the known mechanisms of action of silymarin and similar multi-ingredient supplements. Notably, the alignment between biochemical improvements and clinical signs reported by caregivers (e.g., increased appetite, normalized stool consistency) reinforces the interpretation that the ALT/AST decline reflected genuine improvements in liver function and/or reduced hepatic injury processes.

However, this observational study has limitations typical of clinical practice. The absence of a control group prevents separation of the effects of dietary support from the natural course of disease, the influence of concurrently administered hepatic-support diets, or potential regression to the mean (especially in cases with extremely elevated baseline ALT). The nutritional approach was individualized and may have influenced outcomes (consistent with best clinical practice but limiting causal inference). Moreover, some patients did not attend the ~60-day follow-up visit, limiting the long-term trend analysis. Measurements were restricted to ALT and AST, narrowing the scope for comparison with studies that assessed broader biochemical panels or antioxidant biomarkers. Despite these limitations, several findings are noteworthy. The uniform direction of change—a decrease in ALT and AST in all patients over ~30 days—reduces the likelihood that results were due to random fluctuations. The observable dynamics—a sharp decrease by ~30 days followed by maintenance of low values through ~60 days—support a practical monitoring schedule: an initial check-up at 4–5 weeks and a follow-up at 8–9 weeks to confirm the durability of the effect.

Importantly, the improvements occurred without modifying each patient's individually tailored nutritional management, aligning this observation with real-world clinical conditions.

In summary, this case series suggests a consistent and favorable trend in ALT and AST activity over the first 4–8 weeks of using a complementary feed containing plant extracts and antioxidant components. These findings provide a rationale for continuing research in more standardized settings, with an extended biomarker panel and improved control over confounding variables (e.g., uniform dietary protocol, documented pharmacotherapy) to better determine the degree to which reductions in transaminase activity correspond to lasting clinical and biochemical benefits.

CONCLUSIONS

In this veterinary case series (9 dogs, 1 cat), a 60-day course of daily dietary supplementation with a product containing plant extracts (TSC™ complex), vitamins, and MSM was associated with a clear reduction in ALT and AST activity by approximately day 30, with low enzyme levels maintained through day 60. In most animals, ALT continued to decline slightly over time. Notably, in the subgroup assessed at ~60 days, AST activity was within species-specific reference ranges in all animals (7/7), and ALT was within range in the majority of cases (6/7). The direction of these changes consistent with caregiver reports such as improved appetite and normalized stool consistency, with no clinical signs of deterioration were observed. These results suggest that, in everyday clinical settings, such dietary supplementation may represent a useful supportive strategy for companion animals with elevated aminotransferase levels. The observed biochemical effects generally emerged within the first four weeks of administration.

These findings are exploratory in nature and support the need for further, more standardized research incorporating a control group, an expanded panel of liver-related biomarkers (e.g., ALP, GGT, bilirubin), and a standardized assessment of clinical signs.

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