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Research article

EVALUATION OF HEALTH RELATED QUALITY OF LIFE IN DOGS TREATED WITH CHEMOTHERAPY FOR LYMPHOMA

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Lymphoma is the most common hematopoietic tumor in dogs. The standard diagnostic approach and staging includes detailed clinical history, physical examination and extended laboratory workup including lymph node cytology. Multidrug chemotherapy is the main treatment of the disease. Often, owners are concerned about the side effects of the treatment and the quality of life of their dog during chemotherapy. The aim of this study was to analyze the health related wellbeing of the patients with lymphoma previous, during and at the end of the chemotherapy. Five patients with multicentric lymphoma were monitored in three phases (beginning, middle and end of chemotherapy). The monitoring included clinical examination, laboratory analyses and a questionnaire for the owner. Results revealed significant improvement ($p< 0.1$) of the basic red blood cells parameters (RBC, PCV and Hb), platelets (PLT) as well as liver enzymes (ALT, AST) and protein status (total protein and globulin). Regarding the life quality assessed by the owners, dogs' appetite, general health compared to each visit and the current quality of life were significantly improved ($p<0.1$) and all of the owners were satisfied with the decision for chemotherapy.

Keywords: Canine lymphoma, chemotherapy, quality of life, questionnaire.

INTRODUCTION

Canine lymphoma is frequently diagnosed and treated in veterinary practice and is defined as proliferation of malignant lymphoid cells that primarily affects lymph nodes or solid visceral organs such as the liver or spleen [1]. It is the most common hematopoietic tumor in dogs, and it makes up 83% of all canine hematopoietic malignancies. Thus, early diagnosis, staging, clinical and laboratory evaluation are very important for treatment strategy and improvement of life span [2].

Lymphoma in dogs can be present as multicentric, affecting the peripheral lymph nodes, or as an extranodal form which includes mediastinal, abdominal (gastrointestinal (GI), hepatic, splenic, renal), cutaneous, ocular, central nervous system, and pulmonary

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lymphoma [3]. Clinical manifestation of lymphoid malignant nodal metaplasia is usually atypical (apathy, lethargy, anorexia, pyrexia, polyuria, and dyspnea). Laboratory analyses (hematology and serum biochemistry) can show a wide range of changes, including mild to moderate non-regenerative anemia, leukocytosis or leucopenia, mild thrombocytopenia, elevation of liver enzymes and kidney parameters [4].

Diagnosis of canine lymphoma in the majority of cases can be performed by cytological examination of fine-needle aspirate samples from a palpable enlarged peripheral lymph node or spleen. This method is quick, sensitive, and minimally invasive [5].

Systemic chemotherapy is the main treatment of this malignant disease. The most commonly used multi-agent chemotherapy protocols combine vincristine, cyclophosphamide and prednisolone with or without anthracyclines (COP/CHOP/CEOP, respectively) protocols [6-9]. Rescue protocols are used in patients that fail to respond the first-line protocol or relapsing patients. The ultimate goal of the chemotherapy is obtaining maximal effects with minimal drug administration and toxicity. Chemotherapy destroys rapidly dividing cells, not differentiating malignant from normal cells. Thus, most of the toxicities comprise bone marrow suppression, gastrointestinal disturbances (nausea, vomiting, anorexia, diarrhea), alopecia, which can compromise the patients' quality of life. Proper veterinary-owner communication and owner education about chemotherapy treatment protocol is of great importance for a successful treatment [3,10].

Many owners are concerned about their pet's quality of life during chemotherapy. The veterinarians are responsible for following patient's health during chemotherapy generally by analyzing clinical examination and lab results, while the owners, though quite subjective, are the most reliable factor for accessing their pet's wellbeing [11].

The aim of this retrospective study was to analyze the health related wellbeing of the patients with lymphoma previous, during and at the end of the chemotherapy.

MATERIAL AND METHODS

Design of the study

All dogs included in this study were patients at the University veterinary hospital in a 4-year period. Anamnestic data, clinical examination findings, laboratory analysis (hematology, biochemistry, cytology and blood smear), abdominal ultrasound findings, thoracic radiography, treatment protocol, response of therapy and remission period, were followed for each patient. Comprehensive approach of the patients with diagnosed lymphoma allows proper staging of the disease. Exclusion criteria covered dogs in the terminal stage (V) of disease, with hematology findings of marked anemia, neutropenia and lymphoblastosis on blood smear; biochemistry results presented with dysproteinemia with hypoalbuminemia and elevated activities of a number of enzymes. Education of the owner and explanation of the appropriate chemotherapy treatment protocol was crucial for acceptance by five owners from five dogs with lymphoma.

CHOP multidrug chemotherapy treatment protocol (cyclophosphamide 250 mg/m^2 IV, doxorubicin or epirubicin 30 mg/m^2 IV, vincristine 0.7 mg/m^2 IV and prednisone from 1.5 mg/kg PO with decreasing dose) was used in the recommended dose and weekly intervals in two dogs with no history or clinically present signs of cardiomyopathy. The other three dogs, with previously diagnosed and treated cardiomyopathy, received COP protocol (vincristine 0.7 mg/m^2, cyclophosphamide 50 mg/m^2 PO, methotrexate 5 mg/m^2). Before each intravenous treatment with neoplastic agents, all anamnestic data, clinical examination and laboratory results were recorded in the patient's file. All dogs received palliative treatment with gastro protectants, antiemetic, diuretics and supplements for prevention of eventual side effects. Adverse effects of chemotherapy were followed through hematology, serum biochemistry analyses, owners and clinicians' statements. Additional evaluation of patient's status and quality of life was performed via specially designed questionnaires for the owners.

Patients were monitored in three phases, beginning (1-4 week for COP and 1-6 week for CHOP), middle (5-7 week for COP and 7-15 week for CHOP) end of treatment (8-12 week of COP and 16-25th week of CHOP).

Laboratory analysis

Hematology analyses were performed on veterinary hematology analyzer Exigo (Boule, Sweden), from whole blood in EDTA tubes, immediately after venipuncture form *v. cephalica antebrachi externa*. Biochemistry parameters were analyzed from serum samples, on automatic biochemistry spectrophotometer ChemWell 2910 (Awareness Technology INC, USA), according to the manufacture's instruction of biochemistry reagents Human (Germany). Cytology evaluation were performed with sample obtained from palpable enlarged lymph nodes with Fine Needle Aspiration (FNA), prepared and stained with Diff Quick (Hemacolor, Merck, Germany).

Questionnaire

Evaluation of the quality of life of dogs with lymphoma, which underwent chemotherapy treatment protocol was performed by means of a questionnaire, describing the perception of the owners before the initial phase, in the middle and at the end of the treatment. All questions are designed in other to recognize the quality of life of the dogs with lymphoma. The questionnaire used in this study was a combination of two previously published questionnaires by Lynch S. et al. (2021) and Tzannes S et al. (2008) [12,13]. It was compiled of two parts; first part being equal for all tree questionnaires', while the second part differed for every stage of treatment (beginning, middle, and end). In the first part of the questionnaire, owners were asked to circle the number that best describes status regarding several quality of life descriptors, defined through couple of questions for each descriptor. Thus, the descriptor pets' happiness was defined by playfulness, response to presence enjoys life; mental status was defined by having more good days, sleeping and depression or

dullness: pain was defined by the presence of pain, panting and shaking or trembling; appetite was defined by the intake of usual amounts of food, nausea or vomiting and eating treats; hygiene was defined by cleaning itself, urine smell, skin irritation and greasy coat; water intake was defined by the adequate drinking of water, presence of diarrhea and normal urination; mobility was defined by movement, lying on one place and active as ever. All these descriptors were measured based on scale from 1 (Disagree) to 5 (Agree); as well as the general health at the time of the diagnosis and the general health from the last evaluation (described as worse, same, better). At the end of this part owners were asked to rate the current quality of life (Very poor, Poor, Moderate, Excellent). The second part of the questionnaire consisted of questions about the owner's perception of chemotherapy for their pet before and after treatment, their previous experience with chemotherapy, as well as the reason why they have chosen chemotherapy for their pet, and the side effects they have noticed from the treatment (middle and last questionnaire). They were also asked to describe the aspects they considered important to their pet's life quality, in a written comment field at beginning of treatment. Owners were also asked to comment on how they felt about treating their pet, and whether they would treat another pet. Finally, the owners were asked if their pet was alive.

Data analysis

The hematology and biochemistry results from the different phases of the treatment were analyzed as the average difference (delta value, Δ) of between-treatments for each observed parameter. Meaning, for each parameter the Δ was calculated as a difference from the results after two treatments ($\Delta_{\text{treatment n – treatment (n+1)}}$). The differences of between-treatments delta values were analysed by using the Friedman ANOVA and Wilcoxon Matched Pairs Test.

The received responses on the conducted survey were first analyzed according to the received scores for each question present in the three questionnaires (beginning, in the middle and at the end of the treatment). Later, the analysis continued on the quality of life descriptors level where the scores were summarized on the specific quality of life descriptor in the questionnaire (Happiness, Mental status, Pain, Appetite, Hygiene, Water intake, Mobility and General health). In this analysis the scores for each question were converted so the higher value indicates more positive state of the animal. Thus, the higher score of the specific quality of life descriptor based on the summary of all scores from the questions in the group indicates improvement. Specific questions that were present only in one of the three questionnaires were analyzed and presented qualitatively. The following statistics was used: Descriptive statistics, (mean, median, range, standard deviation), Friedman ANOVA and Kendall Coefficient of Concordance for detecting differences between the given answers in the questions and quality of life descriptor during the treatment of the animal and Spearman Rank order Correlation between the responses/scores given in different time of the treatment. We used an alpha level of 0.1 for all statistical tests.

RESULTS

Out of fifteen cases of canine multicentric lymphoma, diagnosed at the University veterinary hospital, only five dogs received chemotherapy and were included in this study (three Golden retrievers, one cocker spaniel and one mixed breed), with median age of diagnosis 8.4 years. All dogs were classified as clinical stage 3 or 4, according to WHO. According to the owners, all dogs had unspecific anamnestic data with anorexia, dullness, and lethargy, lack of physical condition, cough or difficult breathing. All of the owners noticed enlarged lymph nodes, especially submandibular and popliteal. Three of the dogs were treated with COP chemotherapy protocol, two with CHOP.

Laboratory parameters

Obtained results for general blood parameters such as the number of erythrocytes, hematocrit and hemoglobin concentration, presented significant increase of mean standard value when compared to before, during and after chemotherapy (Table 1). Regarding the results from different phases, there was significant difference in the RBC and Hb values in the second phase versus first and third phase vs. first phase of treatment. Two of the dogs revealed mild neutropenia, one mild thrombocytopenia and one with mild anemia (PCV <35%) regarding hematology analyses on the day of diagnosing the multicentric lymphoma.

Serum biochemistry results revealed significant decline in the liver enzymes levels (ALT and AST) during chemotherapy, as well as increase of the total protein and globulin levels when compared between stages of treatment. The results compared between phases revealed significant difference in total protein and urea levels between second phase versus first and third versus second phase of treatment (Table 1). Regarding the serum biochemistry results, elevated liver enzymes were present in three patients (ALT>60 U/l, AST>50 U/l and ALKP >100 U/l), while in the others the biochemistry was in the reference range.

All cytology slides presented malignant criteria of lymphoblast. All round cells had anisocytosis with blue dark cytoplasm, round nucleus with coarse chromatin pattern and prominent metachromatic nucleoli. Extra cellular matrix contained lympho-glandular bodies.

Quality of life descriptor scores (Table 2), show the owners' ratings for their dog's quality of life in three phases – before, in the middle and after chemotherapy. There was improvement in the life quality descriptors regarding playfulness, enjoys life and health since initial diagnosis when compared with phase one, though no significant differences were found. Scores were significantly higher ($p<0.1$) regarding dogs' appetite, health since last visit and the current quality of life when compared to each visit; followed by high concordance and correlation values.

Table 1. Mean differences between phases in absolute values and percentages and paired comparison between phases by Friedman ANOVA

Parameter	(Δ1-2)	Change%	(Δ2-3)	Change%	(Δ1-3)	Change%	p value
RBC	0.33	3.06	-0.66	-15.10	-0.33	-7.39	0.03*
PCV	-5.09	-27.31	6.02	-1.56	0.92	-0.66	0.06*
Hb	0.26	-1.08	-1.52	-13.36	-1.26	-11.19	0.09*
PLT	-32.57	-19.39	-12.76	-6.18	-45.33	-19.75	0.08*
WBC	3.15	22.83	-1.72	-52.53	1.42	-2.50	0.72
Lymphocytes	0.29	19.97	0.26	0.90	0.56	33.93	0.91
Monocytes	0.51	32.46	-0.18	-65.02	0.33	15.49	0.30
Neutrophils	0.21	-3.36	-1.76	-79.11	-1.55	-61.07	0.34
Eos	0.03	36.11	-0.05	-50.54	-0.05	28.89	0.38
ALT	11.17	17.59	10.52	4.11	21.69	32.29	0.04*
AST	-2.51	-10.40	-2.67	8.69	-5.18	-3.81	0.02*
ALKP	26.50	28.26	-7.72	-9.22	18.78	18.41	0.30
Glucose	-0.08	-3.15	-0.74	6.39	-0.83	4.92	0.58
Total protein	-17.85	-14.92	-5.49	-9.25	-23.34	-15.42	0.05*
Albumin	-7.43	-4.28	-0.27	-0.96	-7.70	-13.77	0.29
Globulin	-10.87	-44.81	-5.38	-22.50	-16.25	-39.57	0.09*
Creatinine	-30.92	-2.71	5.36	0.87	-25.57	4.04	0.29
Urea	-2.33	-12.28	0.67	6.60	-1.65	-10.29	0.47
P	-0.54	-8.04	-0.06	-6.60	-0.59	-13.06	0.54

*p<0.1

Table 2. Comparison of scores between different time of treatment on each question in the questionnaire (Friedman ANOVA (p<0.1). Correlation of scores between different time of treatment on each question in the questionnaire

Question	Stage of questionnaire			Concordance (r) value	Correlation r_s value
	I	II	III		
Playfulness	3.6 ± 1.5^a 4^b	4.4 ± 0.9^a 5^b	4.2 ± 0.8^a 4^b	-0.1	0.14
Response to presence	4.0 ± 1.4^a 5^b	5.0 ± 0^a 5^b	4.8 ± 0.4^a 5^b	-0.2	0.26
Enjoys life	3.8 ± 1.3^a 4^b	4.8 ± 0.4^a 5^b	4.6 ± 0.5^a 5^b	0.2	0.27
Good days	3.4 ± 1.7^a 3^b	4.6 ± 0.5^a 5^b	4.2 ± 0.8^a 4^b	0.2	0.18
Sleepy	3.4 ± 1.8^a 4^b	2.0 ± 1.0^a 2^b	2.2 ± 1.3^a 2^b	0.1	-0.31
Depressed	2.6 ± 2.2^a 1^b	2.2 ± 1.3^a 2^b	1.6 ± 0.9^a 1^b	-0.2	-0.16
Pain	2.4 ± 1.7^a 2^b	2.0 ± 1.2^a 2^b	1.8 ± 1.8^a 1^b	-0.1	-0.19
Panting	2.6 ± 1.7^a 3^b	1.6 ± 0.9^a 1^b	2.0 ± 1.4^a 1^b	-0.1	-0.17

cont Table 2.

Trembling	1.4±0.9 [a] 1[b]	1.2±0.4 [a] 1[b]	1.6±1.3 [a] 1[b]	-0.2	0.03
Appetite	**4.0**±1.4 [a] **5** [b]	**5.0** [a] **5[b]**	**5.0** [a] 5[b]	**0.3****	**0.48 ***
Cleaning itself	4.0±1.4 [a] 5[b]	3.4±1.5 [a] 3[b]	3.4±1.7 [a] 3[b]	-0.1	-0.15
Bad smell	1.8±1.3 [a] 1[b]	1.2±0.4 [a] 1[b]	1.2±0.4 [a] 1[b]	0.0	-0.22
Water intake	4.8±0.4 [a] 5[b]	4.8±0.4 [a] 5[b]	5.0 [a] 5[b]	0.0	0.24
Diarrhea	1.4±0.5 [a] 1[b]	1.4±0.9 [a] 1[b]	2.0±1.7 [a] 1[b]	-0.2	0.07
Urination	5.0 [a] 5[b]	4.8±0.4 [a] 5[b]	5.0 [a] 5[b]	0.0	0.00
Mobility	4.4±1.3 [a] 5[b]	4.4±1.3 [a] 5[b]	4.6±0.9 [a] 5[b]	0.0	0.04
Resting	2.0±1.0 [a] 2[b]	1.2±0.4 [a] 1[b]	1.6±1.3 [a] 1[b]	0.1	-0.28
Active	3.8±1.8 [a] 5[b]	4.4±1.3 [a] 5[b]	4.4±0.9 [a] 5[b]	-0.1	0.09
Health since last visit	**1.6**±0.5 [a] **2[b]**	**2.0** [a] **2[b]**	**2.0** [a] 2[b]	**0.3****	**0.48 ***
Health since initial dg	1.8±0.4 [a] 2[b]	2.0 [a] 2[b]	2.0 [a] 2[b]	0.0	0.33
Current quality of life	**1.6**±0.5 [a] **2[b]**	**2.4**±0.5 [a] **2[b]**	**2.8**±0.4 [a] **3[b]**	**0.70****	**0.72**

[a] Mean±SD values
[b] Median values
*p<0.1 indicates significant difference between the scores in the same question responded at different time of the treatment
** High score of the concordance (r) indicates high level of agreement between respondents

Regarding the questions that were different in every stage of the study, at the beginning of treatment, most of the owners supported the use of chemotherapy. In addition, owners considered that chemotherapy was the best choice of treatment for their pet, although they had never previously been involved in chemotherapy. According to owners' opinion, good appetite, and desire to play and walk were the best indicators of their pets' quality of life during chemotherapy. At the end of the chemotherapy, owners were satisfied with their decision for treatment of their pets and they would treat other future pets if they would have cancer. The owners did not report digestive tract adverse reaction during treatment. Many other symptoms as depression, fatigue, hair loss, decrease in body condition score, pain etc. were absent during treatment. During the induction phase of treatment there were no severe toxicities recorded. Complete remission was obtained in three patients, while partial remission in two. Median survival time was 13.4 months (min 4, max 24 months).

The results of comparison of each of quality of life descriptor in the questionnaire between stages of treatment, showed improvement of quality of life descriptors: happiness, mental status, pain, appetite, mobility, general health; demonstrated thorough the differences between the mean minimal and maximal scores (range from 0.6 to 3). Scores for the hygiene showed no changes, while the water intake scores showed mild decline during treatment (0.4). Nevertheless, no significant differences ($p>0.1$) were found (Figure 1).

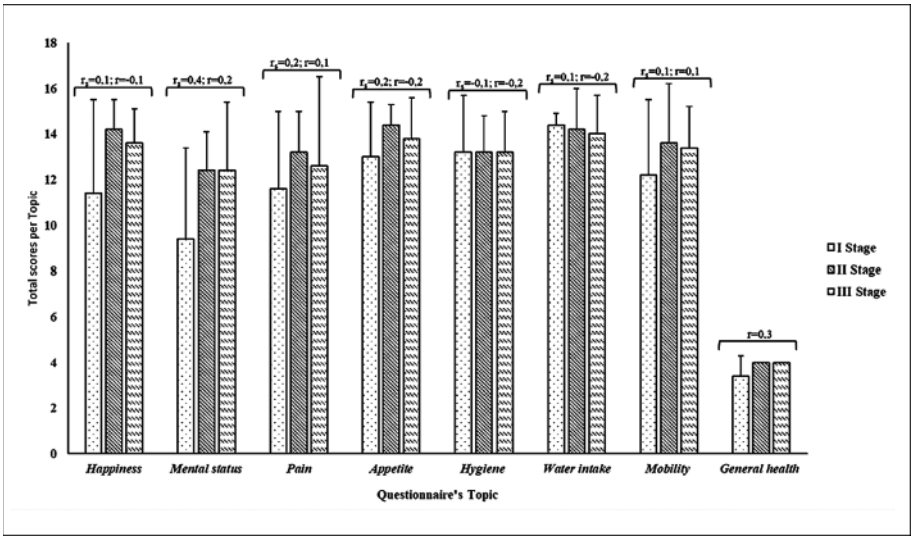


Figure 1. Scores (means – boxes and standard deviations – whiskers) obtained per quality of life descriptor in the questionnaire in different stages (I, II and III) of treatment. No difference was found between stages ($p>0.1$). The figure also presents the correlation (r_s) and concordance (r) between the stages for each quality of life descriptor in the questionnaire.

DISCUSSION

Canine lymphoma is a frequently diagnosed systemic disease, treated and highly responsive to chemotherapy with complete remission in 60-90% of cases [3]. The goal of the treatment that is not as aggressive as in human cancer therapy is often palliative. For most protocols, survival range is 8-14 months, opposite to 4-6 weeks survival time without treatment. Median survival time in our patients was 13.4 months; comparable to other published data [14,15].

One of the most common hematology marker in dogs with lympho-proliferative tumor was the presence of mild non-regenerative anemia. Our results showed a significant increase in the RBC parameters (RBC, PCV and Hb) during therapy. Cytostatic effect of antineoplastic drug did not affect the process of erythropoiesis and hemoglobin synthesis in these patients. It is well known that some antineoplastic agents have a stimulation effect on thrombopoesis and fragmentation of megakaryocytes [16,17].

Synergistic effects of all antineoplastic drugs is suppression of bone marrow and inhibition of production of all cells lines, but in these dogs with multicentic lymphoma did not cause severe cyclic neutropenia and concomitant infection. That might be the reason that the owners did not notice fatigue, discomfort, tachypnea, dyspnea, apathy, lethargy during treatment. Analyzed results considering enzymology status of AST and ALT reported in the middle and last phase of treatment protocol demonstrate normalization of serum activities of both enzymes. Dysproteinemia is a common finding in dogs with metacentric lymphoma; therefore, hyperproteinemia at the initial phase of treatment is corrected in the middle and the end phase of antineoplastic treatment protocol, although presence of hyperglobulinemia was a serum biomarker for immunology disturbance in the treated dogs [18]. These improvements of laboratory results analyses during the stages of chemotherapy are followed by significant improvement of quality of life descriptors like appetite, health since last visit and improvement of current quality of life.

Neutropenia and signs of gastrointestinal toxicities (hyporexia, vomiting, and diarrhea) are most commonly described toxicities during chemotherapy [6, 19]. In our study, mild neutropenia was present in the middle of treatment in two patients (receiving COP protocol), and resolved after one-week delay of treatment.

Many studies have reported the efficiency of COP, CHOP protocols and their variations for canine lymphoma, as well as their side toxicity related side effects [6, 20]. Nevertheless, these studies are not sufficient to assess the dogs' life quality. Implementation of questionnaires assessing the quality of life in cancer patients can help in decision making, treatment protocol evaluation, adjustment of treatment, can provide prognostic indicator information etc. Several studies had been dedicated to the quality of life of the chemo-patient, through owners' perception. [11,13,21-24]

In our study, through the owner's answers of the questionnaire, we concluded that life quality of the patients with canine lymphoma that received chemotherapy was not impaired, and even improved in most of them. The general positive impression given by the owners indicates that chemotherapy is relevant and worthwhile in dogs with lymphoma. Cognition of the possible side effects and their incidence during treatment is very important for owners' decision to treat their pet. [22] None of the included patient in this study developed any serious side effects during chemotherapy, according to medical records and owners' perception, indicating that the protocols had few side effects and good efficiency. This is supported, with the questionnaire results, that majority of owners felt that the quality of life of their pets during chemotherapy was good and even improved besides the minor side effects that some of the patients had. Similar results about owners' opinion regarding quality of life were reported by Thornton et al 2018. [25] The owners were satisfied with their decision for chemotherapy and in case if in future they owned another dog, which developed lymphoma, would undertake chemotherapy treatment again. This is an indicator that owners found the chemotherapy rewarding for their pet and themselves, and was a positive experience. Positive and beneficial effect from chemotherapy of different

types of malignant tumors, recorded thorough different questionaries' were noted in many articles. [11,21,23,25]

The appetite was a significant indicator for pet's life quality according to the questionnaire. This life quality descriptor is easily recognized by the owners (it can be measured), while the other parameters from the questionnaire might be more abstract for them and this might be the reason why there were no significant differences in our study. Appetite as indicator of quality of life was also dominant parameter in the study of Tzannes et al 2008 and Thornton et al 2018. [13,25]. In addition, health since the last visit and current quality of life were significantly improved during treatment, according to owners' answers. Additionally, high concordance values represent high agreement between owners regarding the appetite, health since last visit and current quality of life, as well as continuous improvement with treatment demonstrated by the correlation values. Most of the owners' reported improvement of quality of life in a study by Mellenby et al 2002, and besides treatment complications had no regrets about treatment. [11] The concordance and correlation scores indicate improvement in the life quality descriptors: playfulness, enjoys life and health since initial diagnosis when compared with phase one, though no significant differences were found. The improvement was evident between first and second phase of treatment, with stagnation of scores between second and third stage.

There was no significant difference regarding comparison of different quality of life descriptors between stages of treatment, but a general positive trend of improvement of life quality descriptors was present, with high correlation scores regarding the patients' mental status. In addition, positive improvement regarding patients' happiness, appetite, mobility, pain and general health was noticed when scores were compared with first stage of treatment. Similar questionnaire was used in the study by Milevoj et all 2020, where good mental state and happiness during treatment were described by majority of the owners. [23]

Good clinical practice, communication and education with the owners were the key role for agreement for chemotherapy treatment protocol. Our survey confirmed that the small number of treated dogs due to lack of information about effectiveness of treatment and quality of life of the patients. Thus, metabolic homeostasis reflected on good parameters of life, because all examine physiology parameters did not revealed impairment. All this relevant data should be present trough owner for positive decision making in cancer patients. This preliminary study was conducted on a small number of patients, which prohibits detailed statistical analyses and results that are more significant.

Authors' contributions

EAP participated in the design, coordination of the study, patient selection and data recordings. MKj participated in the design of the study, performed the statistical analysis and helped to draft the manuscript. IC participated in its design and coordination,

laboratory analysis and helped to draft the manuscript. All authors read and approved the final manuscript.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Statement of Informed Consent

The owner understood procedure and agrees that results related to investigation or treatment of their companion animals, could be published in Scientific Journal Acta Veterinaria-Beograd.

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PROCENA ZDRAVLJA I KVALITETA ŽIVOTA PASA TRETIRANIH HEMOTERAPIJOM ZA LIMFOM

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Limfom je najčešći hematopoetski tumor kod pasa. Standardni dijagnostički pristup i određivanje stadijuma uključuje detaljnu kliničku anamnezu, fizički pregled i proširenu laboratorijsku obradu uključujući citološka ispitivanja limfnih čvorova. Hemoterapija sa više lekova je glavni tretman bolesti. Često su vlasnici zabrinuti zbog neželjenih efekata lečenja i kvaliteta života svog psa tokom hemoterapije. Cilj ove studije bio je da se analizira zdravstveno stanje pacijenata sa limfomom pre, tokom i na kraju hemoterapije. Pet pacijenata sa multicentričnim limfomom praćeno je u tri faze (početak, sredina i kraj hemoterapije). Praćenje je obuhvatalo klinički pregled, laboratorijske analize i upitnik za vlasnika. Rezultati su pokazali značajno poboljšanje ($p<0,1$) osnovnih parametara crvenih krvnih zrnaca (RBC, PCV i Hb), trombocita (PLT), kao i enzima jetre (ALT, AST) i statusa proteina (ukupni protein i globulin). Što se tiče kvaliteta života koji su procenili vlasnici, apetit pasa, opšte zdravstveno stanje u poređenju sa svakom posetom ambulanti i trenutni kvalitet života su značajno poboljšani ($p<0,1$) i svi vlasnici su bili zadovoljni odlukom da se sprovede hemoterapija.